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Miscellanea nomenclatorica batrachologica (XII)

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A replacement name is proposed for *Glandula* Tian & Hu, 1985, which is preoccupied by *Glandula* Stimpson, 1852 (Tunicata).

TIAN & HU (1985) ont récemment suggéré de subdiviser le genre *Bombina* Oken, 1816 en deux sous-genres, le sous-genre nominatif et un nouveau sous-genre, pour lequel ils ont proposé le nom *Glandula*. Malheureusement, ce nom ne peut être conservé pour ce sous-genre, car le même nom avait été donné par STIMPSON (1852) à un genre de Tuniciers. Nous proposons ci-dessous un nom de remplacement pour le sous-genre d'Amphibiens. Les deux sous-genres du genre *Bombina* peuvent désormais être caractérisés comme suit :

Sous-genre **BOMBINA** Oken, 1816

Espèce-type, par désignation subséquente de la Commission Internationale de Nomenclature Zoologique (ANONYME, 1957) : *Rana bombina* Linné, 1761.
Diagnose : voir TIAN & HU (1985).
Espèces incluses : *Bombina (Bombina) bombina* (Linné, 1761) ; *Bombina (Bombina) orientalis* (Boulenger, 1890) ; *Bombina (Bombina) variegata* (Linné, 1758).

Sous-genre **GROBINA** nom. nov.

Nomen novum pro *Glandula* Tian & Hu, 1985 (nec *Glandula* Stimpson, 1852).
Espèce-type, par désignation originale sous *Glandula* Tian & Hu, 1985 : *Bombinator maximus* Boulenger, 1905.

Diagnose : voir TIAN & HU (1985).
Espèces incluses : *Bombina (Grobina) fortinuptialis* Tian & Wu, 1981 ; *Bombina (Grobina) maxima* (Boulenger, 1905) ; *Bombina (Grobina) microdeladigitora* Liu, Hu & Yang, 1960.
Etymologie du nom subgénérique : du nom générique *Bombina* et de l'adjectif latin *grossus* (gros, épais).

RÉFÉRENCES BIBLIOGRAPHIQUES

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STIMPSON, Mr., 1852. — [Several new Ascidians from the coast of the United States]. *Proc. Boston Soc. nat. Hist.*, **4** : 228-232.

TIAN, W. & HU, Q., 1985. — Taxonomical studies on the primitive Anurans of the Hengduan Mountains, with descriptions of a new subfamily and subdivision of *Bombina*. *Acta herpet. sin.*, **4** : 219-224.

Living amphibians of the world : a first step towards a comprehensive checklist

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CONTENTS

The checklist *Amphibian species of the world*, result of a collective work by 59 authors, gives the names of 4015 living species of amphibians, along with various types of information concerning them. Although such a list is potentially of great interest, both to systematists and to all other biologists working on amphibians, this first edition raises several important problems. The choice of the information given in the book seems open to criticism : in particular, the absence of synonyms and of subspecies names greatly reduces the usefulness of such a list. Besides, even for the data which appear in the book, the rate of errors and of omissions, such as it may be estimated for a variety of types of information, is much too high for this list to be considered a valuable standard in amphibian taxinomy, nomenclature and bibliography. This is clearly due to the fact that this first edition was prepared and published much too quickly. It therefore seems advisable to await at least the second, revised, edition of this book.

FROST, Darrel R. (ed.). — ***Amphibian species of the world. A taxonomic and geographical reference.*** First edition. Lawrence, Kansas, Allen Press and the Association of Systematics Collections, 23 August 1985 : [i-iv] + i-v + 1-732. Price (cloth-bound) : US $ 85. — Cited below as *ASW*.

Note. — This paper was written at the request of the editors of *Copeia* for the "Reviews and comments" section of this journal, but was finally considered too long and detailed for this journal. It is therefore published integrally here, while a brief summary of it will appear in *Copeia* (1987).

In order to save space, the various papers by DUBOIS cited below will be referred to using code numbers, which are made explicit in the bibliography. D-41 refers to the present paper.

Acknowledgements. — I wish to thank Annemarie OHLER for her help in the preparation of this paper, and Ronald I. CROMBIE, Richard WASSERSUG and particularly Carl GANS and Jean-Jacques MORÈRE for reading the original manuscript and for their comments about it.

INTRODUCTION

The checklist *Amphibian Species of the World* recently published by the Association of Systematics Collection and Allen Press is an impressive hard-bound volume of more than 700 pages, the aim of which is "to serve as a standard reference to amphibian nomenclature" (*ASW* : [ii]). Although this does not appear in its title, the list concerns only the living species of this class. The list was edited under the direction of Darrel R. FROST, under the auspices of the World Congress of Herpetology and its Checklist Committee, composed of William E. DUELLMAN (Chairman), Robert C. DREWES, Carl GANS, Alice G. C. GRANDISON and Marinus S. HOOGMOED. It was compiled by 59 batrachologists working in 20 countries (not 21 as stated in *ASW* : iii), who clearly devoted a lot of their time to the patient collection of the information which is finally presented.

The book poses a genuine bibliographic problem. How should it be cited ? The simplest solution would be to quote it in all cases as "FROST, 1985", or "FROST et al., 1985". But in many cases this would not do justice to the fact that most sections of the book have been entrusted to specific "contributors", and modified by specific "reviewers" (some of whom made specific comments which are signed with their initials). A comment like the one on p. 14 signed "JDL" should certainly be quoted as "LYNCH in FROST, 1985". A section like the genus *Arthroleptis* (pp. 14-16), contributed by Raymond LAURENT alone, should certainly be quoted as "LAURENT in FROST, 1985". Now, how should be cited an information which appears in a section for which there was no specific contributor, and which was "completed in cooperation between the editor and the reviewers" (p. 2)? The section Brachycephalidae for example (p. 24), which only contains two monotypic genera, has no specific contributor, but is credited with 10 reviewers : should this section be cited as "FROST, BOKERMANN, CANNATELLA, CARAMASCHI, CROMBIE, DUELLMAN, GUDYNAS, HOOGMOED, MCDIARMID, SCOTT & VANZOLINI in FROST, 1985" (!), as "FROST et al. in FROST, 1985", or as "FROST, 1985"? The same problem arises for the sections which are credited to several contributors, even when the checklist mentions the geographic region of their respective contributions. Thus, the text on the genus *Rana* is credited to 6 contributors, but the geographic regions covered by three of them partially overlap : Sushil DUTTA (Tropical Asia), Shuqin HU (China) and Masafumi MATSUI (East Asia). How should be quoted any given information dea-

ling for example with a species of tropical China ? Furthermore, the contributors mentioned at a given taxinomic[1] level (e.g. the subfamily Raninae : 5 names) may not include those mentioned at a lower level for included taxa (e.g. the genera *Batrachylodes*, *Ceratobatrachus*, *Discodeles*, *Palmatorappia*, *Platymantis*, *Rana*, *Strongylopus* and *Tomopterna*, which were partially or totally contributed by authors not included among the first 5 ones). For this reason, correct citation of the checklist will be a difficult task in many cases where the attribution of a given information to a given author is ambiguous. To simplify, in the following discussion the checklist will be quoted in all cases as *ASW* (*Amphibian Species of the World*), but this should not obscure the fact that the various parts of it were contributed by different authors.

In this list, "complete to 1 June 1984" (*ASW* : 2), I counted 4015 nominal species considered valid (not 4014, as stated on p. 1), arranged in 395 genera and 37 families. The last checklist of the amphibians of the world, supposedly complete "to January 1, 1970", that of GORHAM (1974), contained 3343 nominal species (D-4), arranged in 347 genera and 28 families. Even though both checklists are incomplete and contain mistakes, these figures show that an important increase (by 20.1 %) in the number of known or recognized species of amphibians has taken place in the last 15 years period, thus indicating that the field of "microtaxinomy" (MAYR, 1982) in still lively in this group of vertebrates, and will remain so still long (see also D-4). The increase is also high for the number of recognized genera and families (respectively 13.8 % and 24.3 %), which also points to the fact that the "macrotaxinomy" of this group is not yet stabilized. In fact, even if many genera are named and formally described, their phylogenetic relationships are often poorly known and still not known at all for some of them. In the future it will be as necessary to work on the higher classification of amphibians as to continue describing new species and revising difficult and poorly understood groups.

Every batrachologist can only be enthusiastic with the idea of such a book. A comprehensive list of names of living Amphibia in the world would be most useful not only to taxinomists but also to all batrachologists and to all biologists of all disciplines (ecology, biogeography, nature conservancy, evolution, genetics, biochemistry, developmental biology, physiology, etc.) who may have, at a given stage of their research, to know the valid name of any amphibian species, its phylogenetic relationships, its place within the current classification, its geographical range and its possible status as an officially endangered species. Like many colleagues, I had applauded this project and thought it would happily replace the *Das Tierreich* volumes, which cover only certain groups and are now outdated.

My hope was only very partially fulfilled. Certainly, the book exists, which is better than nothing ; it will certainly also be useful, at least to those who will use it knowing its strengths and weaknesses. However, this book is not what one could expect. What constitutes, in my opinion, its weaknesses, is detailed below. Before doing so, however, I wish to make clear that I had been contacted by William E. DUELLMAN and Darrel R. FROST, who had proposed me to participate in the elaboration of this book, but that I had finally resigned from this work. In a letter dated 25 January 1983, they proposed

1. I use the correct spelling "taxinomy" instead of "taxonomy", following PASTEUR (1976) and FISCHER & REY (1983).

me to act as contributor for the sections Megophryinae and European and Asian Raninae of the book. In a letter dated 8 March 1983, I answered that I would accept this work under certain conditions. FROST sent me the first computer printout of most of the Ranidae and of the Megophryinae on 1st April 1983 and asked me for my corrected manuscript in June 1983. After having started this work, I realized that it could not be ready for this date and answered I was giving up the project because the time provided was too short. Beside that, I stated that I was ready to care for the suprageneric nomenclature part of the whole project. To this last proposal, FROST answered on 14 June 1983 that he would send me a printout of the citations for higher taxinomic taxa, but I never received it.

The above comments are given in order to show that the following review is not the reaction of a frustrated batrochologist angry not to have been asked to participate in this collective work : actually, I *had* been asked to do it, but refused, for the very reasons which lead me now to criticize the work, i.e., that it suffers mainly from having been produced in haste. The following comments shall be divided into two parts : general comments dealing with the conception and realization of the book ; analytical comments dealing with precise examples scattered throughout the book and dealing with various types of information.

GENERAL COMMENTS

CHOICE OF THE INFORMATION GIVEN

The quantity of information which can be included or indexed in a checklist is virtually unlimited. It would certainly be nice to have a book giving the names of all taxa with information on their history, nomenclature, classification, phylogeny, distribution and all other biological attributes. However, generation of such a list would take a very long time, and its publication would occupy several volumes the size of *ASW*. It is therefore necessary, to save time and space, to make a choice among the possible information which such a checklist can contain. The choice of this information should be based on the public to whom the book is addressed, and in this respect it is not quite clear to me for whom this book is specially intended. From the various forewords, il would seem that this list is not meant to be useful only to professional batrachologists, but also to all other biologists. But one may wonder if the choice made concerning the types of information given in the checklist is the best one in this respect. These types of information are of 12 sorts.

(1) Valid (or supposed valid) names of all taxa of Amphibia of the following ranks : class, order, family, subfamily, tribe, genus, subgenus and species. In addition, a few names of taxa of the ranks of suborder, superfamily and subspecies are given incidentally in the book, but there is no consistency.

(2) Authors, dates and bibliographic references of the works where the names of all taxa of the ranks class, order, family, subfamily, genus and species were created (or supposedly created). In addition, a few references are also given for some taxa at the subgeneric and subspecific levels, but again without consistency. No reference is given for taxa of the ranks suborder, superfamily and tribe.

(3) "Original names" of species (when they are different from the current names). Under this title are given in fact two rather different types of information. In some cases the "original name" is the original *combination*, when a species was first described in a different genus from that where it is currently placed ; the author of the current combination is generally not mentioned. In some other cases the "original name" is only the original *spelling*, when this spelling was an "incorrect original spelling" in the sense of the *Code* (ANONYMOUS, 1985 a), and has to be replaced by a "justified emendation" ; the first author to have used the justified emendation is generally not given. In a few cases, finally, the "original name" differs from the name considered valid in the checklist both in combination and spelling.

(4) Original spellings of names of families and subfamilies. This information appears incidentally in the "comments" following a few names, but is not given in all cases.

(5) Authors, dates and references of the works where first appeared (or supposedly appeared) the justified emendations of familial or subfamilial names which had been created under incorrect original spellings. As in the preceding section, this information is given incidentally in some cases but not in all.

(6) Type species of genera. This information is given for all genera of Amphibia recognized as valid in the book, but not for the few generic names currently considered synonyms which are mentioned. It is not given, except for one exception (*Echinotriton*), for the subgenera recognized as valid in the checklist.

(7) Kind of type fixation of genera. This information is given in only a part of the cases (see below for more detail).

(8) Type specimens (holotypes, syntypes, lectotypes or neotypes) of nominal species : location (identification of the collections where they are kept, in general Museums) and collection numbers. This information is given only for a part of the species, and is sometimes complete, sometimes incomplete (e.g. the location may be known but not the collection number, or only a part of the syntypes of a species may have been traced ; see below for more detail).

(9) Type locality. This information is given for all species, but usually not for subspecies and synonyms.

(10) Distribution. This information is given for all taxa of the ranks class, order, family, subfamily, genus and species, and exceptionally for a few taxa of other ranks.

(11) "Comments". This section gives various types of information, including : discussions on phylogeny and classification ; nomenclatural discussions ; in a few cases, mention of synonyms (for some taxa of the ranks genus, subgenus and species) ; in a few cases, mention of subspecies (with or without complete bibliographic reference to the works where their names were created, with or without mention of their type specimens, with or without their type localities and distributions) ; and references to relevant works of all kinds dealing with these taxa.

(12) Protected status. This information is given for the few species of Amphibia governed by the USA Endangered Species Act (USA ESA) and listed in the Appendices of the Convention on International trade in Endangered Species of Wild Flora and Fauna (CITES).

Of the above types of information, most (i.e. types 1 to 9) give nomenclatural data on names, while only 3 (i.e. types 10 to 12) give biological information on taxa.

Among all these types of information, which ones are likely to be useful to the various kinds of biologists who are not primarily concerned with systematics and nomenclature and to whom the book is supposedly intended ? I would suggest such biologists will mainly seek in such a book : (a) information about the relationships of the taxa and the supraspecific classification ; (b) exact names of the taxa with dates and authors (but not necessarily details such as the original name or the detailed citation of the original reference) ; (c) complete synonymies of all taxa names ; (d) type species of genera ; (e) information on the geographical distribution of taxa, including data on geographical variation within species and the existence, name and distribution of subspecies ; (f) a list of key references allowing to trace all relevant works dealing with a given taxon (taxinomic revisions, faunistic works, other biological works of importance).

The importance of some of this information, maybe not evident at first sight, should be underlined. The need for complete synonymies, for example, may be underestimated. They are necessary in order to allow the users of the list to trace the current names of species which were given other names in the past. In Amphibia, such cases are numerous. Many older experimental works deal for example with species which were then known as *Bufo vulgaris*, *Rana fusca*, *Triton palmatus*, etc. All the information that may have been gathered then on these animals (through field work, observations or experimental research), and which had then been attached to these older names, may be lost, or improperly allocated, if nonsystematists cannot easily identify the biological species to which both older and newer names apply. This in my opinion is one of the major objectives one should keep in mind when preparing such a checklist.

Besides, it is important to clearly make the distinction between two kinds of names : those which are nomenclaturally *available*, and those which are considered *valid* at a given moment of the nomenclatural history of a biological group. It should be stressed that such an history is extremely dynamic, because a name that has been once considered invalid as being a junior synonym of another name may be resurrected as a valid name later if it is shown that both apply to different biological species : as a matter of fact this happened already for many names of Amphibia ; similarly, in the species-group some secondary homonyms may in some cases be resurrected when such names are transferred from one genus to another (see Art. 59 of the *Code*). The fact of giving in a checklist only those names which are considered valid at the time of completion of this list supports a static conception of nomenclatural history which is not born out by the facts. The absence of synonyms and homonyms greatly reduces the usefulness of the book as a "standard reference to amphibian nomenclature". It has also another disadvantage : since it is not complete, this checklist (or its index) cannot be used to know whether a given specific name has already been given to a species of a given genus, an information which is useful in order to avoid creating homonyms. In its present state, the checklist and its index will only allow to find such names if these are currently considered valid specific names, but not, except for some exceptions, if these names are currently considered synonyms, nomina dubia, or valid subspecific names (see below).

Knowledge of the type species of genera is also useful : for example, if an experimental biologist wants to compare different genera for given characteristics, he may wish

to use only one species by genus, and in such a case it would seem best to use, if possible, the type species of all compared genera : even if the limits of genera are liable to change with future taxinomic works, the type species of nominal genera won't change and will remain stable reference marks for future comparative works.

Information on geographic variation and on subspecies is also important, for all workers interested in evolution at lower levels. Precise data on the geographic distribution of recognized subspecies of polytypic species, or bibliographic reference to such data, should appear in any such checklist. It should be stressed furthermore that the taxinomic research of the last period has shown that many taxa considered in the past as subspecies were either strict synonyms or, on the contrary, good species ; symmetrically, cases of downgrading of specific names to subspecific level are also known, although less abundant (see D-4). A good knowledge of the present state of this question in any given group is most important in many types of works, and should be given without restriction in a list like *ASW*.

If we now compare these needs with *ASW*, we can make the following statements : (a) the information about relationships and classification is generally satisfying, except at higher levels (suborders and subfamilies of Anura) and at lower levels (subgenera and species groups), and although the classification in its whole is not very homogeneous (see below) — but this is quite unavoidable in the present state of the taxinomy of the Amphibia ; (b) the list gives the names, authors and dates of the taxa, but furthermore is made cumbersome by the mention of the original names and the heavy mode of notation of the original references in the text ; (c) synonymies are rarely given (sometimes, some synonyms are mentioned in the "comments", but there is no real rule in this respect : a species name that has recently been synonymized or resurrected may often be mentioned as such, but most older synonyms are not ; generic names are almost never given) ; (d) type species of genera are given, although in many cases without details on their mode of fixation ; (e) some information about the geographical distribution is given, but the subspecies are usually not listed (there is also no real rule about it : when a subspecies has recently been described, or elevated to species rank, or the contrary, it may be mentioned ; but most subspecies are not) ; (f) from one group to another, the completeness of the comments and of the relevant bibliography given varies exceedingly : in a few cases it is excellent (e.g. genus *Xenopus*), in other ones it is really bad (e.g. *Rana esculenta* synklepton) ; in general, it is very brief, rather insufficient.

Besides, it should be stressed that the checklist devoids great deal of space to a type of information which cannot be considered as important for nonsystematists as some of the lacking information mentioned above : the information on type specimens and type localities of species. My opinion is that this information will be useful mostly, if not only, to taxinomists, and should not have been given priority over information on subspecies and synonyms in a checklist intended to be useful to biologists of various kinds.

What is the use of type specimens ? In the older days of pre-evolutionary, typological thinking (see e.g. MAYR, 1969, 1982), types were believed to be "typical" specimens, exhibiting "typical" characters of species, and specimens showing different characters were attributed to different species. All specimens of a given species were believed to be identical or almost identical to the type, and were often treated, in older Museums, as "duplicates", which were often disposed of (exchanged, given away or destroyed). The

situation changed with the emergence and development of the evolutionary and populational thinking : the "type" was reduced to being only one of the specimens of a variable species, and could well not exhibit some of the characters considered diagnostic of a species (see e.g. D-4). The rôle of type specimens in systematics has considerably changed, to a point that has perhaps been under-estimated by some taxinomists. Type specimens are not used any more for supposedly exhibiting diagnostic characters (although they may often also do so), but primarily for a *nomenclatural* purpose : a type specimen is an *objective* reference to a *natural population* of animals, and a way to objectively *attach a name* to this population. In recent revisionary works for example, taxinomists study species limits, diagnoses, distributions, etc., on the basis of as many specimens of various origins as possible. During this work, they do not (or should not) give a particular importance or significance to type specimens, which are only specimens among others. Only once the revision is finished, the biological species and their intra- and interpopulational variability understood, should the type specimens of the nominal species included in the revision be examined, in order to know which names should be applied to the various biological species defined by the revision. The type specimens have now a purely nomenclatural rôle in systematics, for defining *names*, but they do not any more have the special rôle which they used to have in the past for defining *taxa*.

Two conclusions may be derived from this assertion : (1) except in the case of the now relatively rare species of Amphibia which are still known only by their types, type specimens are not any more important than any other Museum specimens referred to a given nominal species after a recent revision, or than any other freshly collected specimen determined on the basis of such a recent work ; (2) on the other hand type specimens still play an important rôle in systematics in that they are the only "bridge" linking the real world (biological species) with the world of language (nomenclature). Type specimens remain thus most useful to systematists, but to systematists alone, in allowing them to objectively tie scientific names to biological species. But in this respect all type specimens of existing nominal taxa play the same rôle : type specimens of nominal species the names of which are homonyms or are currently considered synonyms or valid names of subspecies are as important for systematists as type specimens of nominal species the names of which are currently considered valid specific names. Therefore, if a list like *ASW* is to give the references of type specimens, it should give all of them, irrespective of the fact that the names to which they are attached are currently considered valid specific names or not. Doing differently reminds me of the true story of a Museum worker who told me that, when a specific names is placed in synonymy, its type specimens lose their status of type and should not be listed in a catalogue of types ! Unfortunately, by listing only the type specimens of the species currently considered valid, the authors of *ASW* seem to adopt the same philosophy. To list type specimens of valid species but not of homonyms, synonyms and subspecies seems to imply that these types are more important than other specimens to know and characterize biologically a species, which is completely wrong but shows that typological thinking is still alive among contemporaneous taxinomists. I therefore consider the choice of mentioning type specimens rather than listing synonyms and subspecies in such a book as a *scientific* error due to a survival of typological thinking.

Mention of type localities of species meets with the same criticism. Since the checklist gives the distributions of species, mention of type localities has only a nomenclatural interest, and particularly in the case of species which can be subdivided into several subspecies : but here again, to make this information useful, il would be necessary to give also the distributions and type localities of all subspecies.

Thus the information concerning type specimens and type localities is of little interest to nonsystematists. It is true however that this information will be of interest to taxinomists, although its incompleteness will greatly limit this interest. It should be stressed however that systematists have other ways to seek this information : once one knows the name of the species, its author and date, it is easy to go back to the original description and see whether the type locality and the type specimens are given there ; if not, in many cases it will be possible to find this information by writing to the curator of the institution where the author was working. In the remaining cases, it is true that a long inquiry may be necessary to find out the present location of the types, and if this information was available for all taxa in a checklist like *ASW*, this would save much time to Museum systematists all over the world. However, careful examination of *ASW* shows that it usually gives this information only in two cases : (1) when it has already been searched for by the author of a revision, of a previous checklist or of a type catalogue : this is for example the case of all the types traced earlier by DUELLMAN (1977) in the families Hylidae, Centrolenidae and Pseudidae ; in this case, direct use of DUELLMAN's checklist would provide the same information as *ASW* — and even more, because it includes the types of synonyms and subspecies ; (2) for species described by well-known authors who used to deposit their types in a given institution ; in this case, *ASW* often gives the location of the types without giving their numbers : the same information could have been found by any taxinomist without the help of the checklist.

A checklist should not contain, as far as possible, original data. These should be published independently in papers cited in the checklist. This means that a checklist is unavoidably rather heterogeneous, according to whether any given group has or not been the matter of a recent revisionary work. In the case of the type specimen section, a peculiar problem arises. As far as in most ancient publications the types, and their Museums of deposition and numbers, are not mentioned (if it was not the case, it would be completely irrelevant to search for them and list them in a checklist), searching this information is a genuine scientific work, sometimes long and unrewarding. To include such an information in a checklist is contrary to the principle just set forth. When this research has been done on the occasion of another revision or list, like for example DUELLMAN's (1977) checklist mentioned above, reference to this list should be enough. In the other cases, if genuine research is involved, who will be the author(s) of the original information first published in the checklist ? The editor ? The contributor(s) ? The reviewer(s) ? In most cases, this information appears anonymously in *ASW*. This raises additional problems. For example, when type specimens are mentioned, for the first time in *ASW*, as being "lost" or "destroyed", this list should give us the evidence on which such an information is based : either a bibliographical reference, or the author of this statement (letter from a curator, personal observation of a contributor, etc.). In the absence of such statements, it is difficult to know the seriousness and validity of such types of information. Actually, in several cases I found the mentions "not traced" or even "lost" for type specimens

which are still perfectly extant, and easy to trace, in major Museums (details on these cases will be published elsewhere).

The preparation of this book could have been a good occasion to make an international inquiry among all natural history Museums (which are listed in Appendix II of *ASW*, pp. 665-669). This could have been done for example in taking advantage of the fact that all the data on which the list is based are stored on computer and in using the latter to prepare a list of species names for which every Museum collection is supposed to have the type specimens and to ask these Museum confirmation of the existence of these specimens at this date and their proper collection numbers. However, no such inquiry was done by the editors of *ASW* — or, at least, the Paris Museum, the third largest collection in the world for the types of amphibians (see Table XI), was never contacted in this respect.

There is at least one kind of type specimens which could have been quite useful for taxinomists to list in a book like *ASW* : the types which were fixed by an action posterior to the original publication where the name had been created, either by a selection among various syntypes and choice of a lectotype, or by designation of a neotype when the original type(s) is (are) no longer extant. It is true that these types are much more difficult to find than original holotypes or syntypes, because any author acting after the original description may potentially designate such types, and it would be useful to have a reference to such actions in the "comments". In this respect, it is disappointing to find that the information given in *ASW* on such types is incomplete or false in several cases (see below), thus reducing again the interest of giving the information on type specimens in the book.

A good decision of the authors of the checklist has been to list only holotypes, but not paratypes, which have no particular meaning or importance in nomenclature. Then, why have some paralectotypes been listed in the book ? There is no rule about it : in some cases, only the lectotype is listed, which is correct ; in other ones, all syntypes are listed, then the lectotype designation is added, which is much too heavy : after a lectotype has been designated, all other syntypes lose their status of "types", and become "paralectotypes", which have as little nomenclature meaning or importance as paratypes.

Another type of information which could have been useful to amphibian taxinomists is the one bearing on the nomenclatural decisions taken by the ICZN (International Commission on Zoological Nomenclature) with respect to family-group, genus-group and species-group names of Amphibia. Some of these decisions are mentioned incidentally in *ASW*, but most of them are not. In particular it would have been useful (and not especially time and space consuming) to list in this book all the amphibian names which have been placed on Official Lists of Conserved Names in Zoology and on Official Indexes of Rejected and Invalid Names in Zoology, with their numbers on these Lists and Indexes. This has already been done for all familly-group names and some genus-group and species-group names by DUBOIS (D-26), and should in my opinion be added in future editions of *ASW*.

A strange situation is met with as concerns the status of nomina dubia (names which are nomenclaturally valid but cannot be associated, at the moment, with given biological taxa). Such names can have some importance for systematists, as potential senior or junior homonyms, and as potential senior or junior synonyms (if their status happens to be elu-

cidated). However, they are less important than names the status of which is clear (either as valid specific or subspecific names or as synonyms), and it does not seem logical to include them in a checklist which ignores subspecies and synonyms. While most of these names have in fact been deleted from the checklist, it is thus surprising to note that some of them have been listed, for example in the genera *Hyla*, *Hyperolius* or *Leptodactylus* : in these few genera we have therefore a strange situation where some names are listed but almost nothing is known about them, while other well-known names are not even mentioned simply because they apply to subspecies or are currently considered junior synonyms of other names. It would have seemed justified to homogeneize the checklist by suppressing all nomina dubia — or including all nomenclaturally available names of Amphibia without exception.

In the *Preface* of *ASW* (p. iii), the World Congress of Herpetology Amphibian Checklist Committee writes : "Originally it was hoped that the list would contain synonyms and subspecies. However, it soon became obvious that the inclusion of synonyms (and their citations and type localities) would not only increase the size of the volume beyond the reasonable limitation that had been set for it, but would require more effort by the contributors and reviewers." It is thus clear that this information was not included in *ASW* to save space and time. However, one may wonder if space and time could not have been spared more efficiently if a different choice had been made as to the type of information to be included in the checklist and its mode of presentation.

A first remark can be made about the way bibliographic citations are printed. References are given in the text itself, in an abbreviated form including only the abbreviated title of the periodical or book and the relevant pages, but not the complete title of the work (as in traditional synonymies from the end of the XIX century and the first part of ours), and are not given in full in an alphabetical bibliography at the end of the book (as in most recent works). A selected bibliography appears at the end of the volume, giving the titles of some of the books cited in the checklist (but not all) and the full titles of the periodicals cited. This presentation has several disadvantages. It is for example impossible to find out immediately, by looking at the bibliography, if a given publication has been known to the authors of the checklist and used by them, or not. It is also impossible to find a list of references of a given author cited in the book. This system of presentation is probably intended to save some space (and also perhaps to remain in the tradition of presentation of synonymies in older works). It may save some space at the end of the volume, but it certainly expands the text itself, and makes its reading much more difficult and unpleasant. Furthermore, on the whole it may even not really save space, when one considers that many papers (catalogues, checklists, faunas, revisions, etc.), the abbreviated reference of which may be almost one line long, are cited several times in the book, and some of them many times : if these papers were quoted in full only once in the bibliography, and referred to only by the author's name and a date (with or witout an additional letter) in the text, this would save much space. It is impossible to know a priori which system would occupy more space, but the modern system of short references in the text and complete references in bibliography at the end is much more efficient to use and provides more information (complete titles of publications, number of pages, etc.), and for this reason should have been preferred in this book. But there are several other ways to save space in such a checklist.

In some checklists, species are only indicated by their names, with their authors and dates, and, sometimes, the original generic names under which they had been described if they have changed later (this is the case for example in GORHAM's 1974 checklist). This présentation has the advantage of saving space (the space for the original name, when relevant, and for the original reference, be it in the text or in a final bibliography) and time (for the collection of the above information). Besides, it has no real disadvantage : with the help of the *Zoological Record*, it only takes a few minutes to find out the original reference, starting with the name of the author, the date and the name of the taxon ; for references prior to 1864, date when the *Zoological Record* was founded, this work may be a little longer, but with the help of the previous checklists (British Museum's *Catalogues*, *Das Tierreich*, etc.), it usually remains rapid.

What space would save the suppression of this information ? I had the curiosity (and patience) to count the number of lines which would have been saved if only author and date had been given for all scientific names, without the original reference, and also if the sections "original name", "type(s)" and "type locality" had been deleted : I found respectively 606, 1626, 4448 and 5823 lines, i.e. a total of 12503 lines. Altogether, therefore, "suppression" of this information would allow to save much more space than would be needed to allow adding synonyms and subspecies without increasing the size of the book, provided each of these names is given only with its author and date, without reference, nor original name in full (a different generic attribution could be mentioned on the same line, like in GORHAM's 1974 checklist), thus occupying only one line each. As a matter of fact, in GORHAM's (1974) book, DUBOIS (D-4) counted 1009 subspecies (including 323 nominative ones and 686 others) and 2252 names considered invalid (synonyms, homonyms, replacement names), which would occupy 2938 lines altogether. From 1970 to 1984, the number of subspecies and synonyms has probably not increased very much, because if it is true that new synonymies have been discovered and new subspecies described (or downgraded from species rank), it is also true that in the same period a number of names were resurrected from synonymy or elevated from subspecific to specific rank. However, even if we assume, probably incorrectly, that the rate of increase of these two categories of names has been the same during this period as the rate of increase of specific names considered valid, i.e. 20.1 %, the total estimate would be 3529 names, which would still occupy less space than the information on type specimens alone (4448 lines) or on type localities alone (5823 lines).

It is thus clear that with a different editorial policy as to the type of information to be given in the book, inclusion of data on synonyms, homonyms and subspecies could have been possible without increasing the size of the book. The problem "space" could then have been solved, but this would not have suppressed the problem "time" and "effort", and I think that here lies the true reason for not including synonyms and subspecies in *ASW* : for some reason, the editors wanted to publish the list quickly, and could not afford for the large increase of working time which would have been necessary to add this information. We are therefore now led to the study of the conditions of preparation of the checklist, especially as concerns the quickness of preparation.

CONDITIONS OF PREPARATION

As explained by FROST in the *Introduction* of *ASW* (p. 2), the procedure of compilation of the book was an "iterative" one : a "skeleton checklist" was compiled by FROST,

and entered on computer files ; its various sections were sent to various contributors for completion, and returned to the editor for addition to the computerized data base ; after correction, they were sent back again to the contributors, and the completed sections were also sent to one or more reviewers for augmentation and correction ; the final copy was read and approved by the contributors and the checklist committee ; final standardization work was done by the editor. This work was carried over from 1982 to mid-1984. The data base for the checklist is being maintained on computer files, which will be updated "so that a new up-to-date version of the list can be produced at any time in the future" (*ASW* : iii).

While the process of compilation described above may sound very nice, being a collective one in which any one's work was supposedly commented upon and corrected by others, an important point must be stressed here : the production time for the work was very short. Having myself worked quite a bit on similar projects, I know by experience that they cannot be seriously completed within a prefixed amount of time, especially when this time is short, and even when one devotes an important part of one's time to this work. Serious compilation of checklists of this kind really demands an enormous amount of time, which is clearly underestimated by the "users" of these lists. It requires in particular considerable bibliographic research, which is extremely time-consuming as all original works must be traced and directly consulted ; the experience proves that, when one avoids this work and when one uses second-hand references and information, one often repeats the mistakes of previous authors (see below for more detail). Furthermore, it is clear that most of the contributors and reviewers agreed to devote a lot of their time to the project to build up a list which seemed to them the best one, but that it was not their primary job at this time ; only the editor was "hired" by the ASC and paid for the completion of the book. As many contributors and reviewers were unable, for reasons of time and sometimes of geographic location, to have access to all the relevant original literature, a lot of verification work rested on the shoulders of the editor at the end of the work. For a really serious work, he should then have checked himself in the original publications all the information given by the contributors and reviewers. That he did not do so will be made clear in the detailed analysis that will be presented below. The main reason for that is clearly the lack of time, due to the stringent time constraints which were apparently imposed by the publishers.

It is true that we are now in a period where rapidity of work and publication is considered one of the qualities a scientific researcher must have. The reasons for that are not scientific at all, they are rather sociological, or more precisely economical. It is a rule that many scientific works are now prepared and published very rapidly, for reasons of financing, contracts, careers, etc. Careful study often reveals that these works were prepared and completed *too* quickly. I strongly urge my colleagues to consider that, contrary to the current dominant ideas in this field, rapidity of execution is *not* a criterion of good quality of a scientific work. The relevant criterion should be seriousness, which should assure the work to have a long life, and to be still useful to workers in the distant future.

The *ASW* checklist falls fully into this trap. Furthermore, there seems to have been a certain fascination of the publishers with the computer. It is true that, as mentioned in the *Foreword* of *ASW*, the computer allows a considerable saving of time for the treatment of data. But the computer only gives back to you what you have put in it. If you

introduce false or incomplete data, they will remain so even after the most sophisticated treatment by the computer.

It is also perfectly true that any checklist is provisional and subject to revision in the future. But it may be so for three distinct reasons : (1) subsequent progress of science, which leads to a modification of what was known when the checklist was compiled ; (2) the inevitable errors in works of this magnitude ; (3) incomplete, too rapid work during the preparation of the checklist, which is a bad or incomplete reflection of the state of science at the time of its publication.

Unfortunately, whereas the first two reasons are unavoidable, the third one is not. As will be shown in detail below, the *ASW* checklist cannot be confidently used as a primary source by taxinomists and other biologists, because of its high rate of mistakes, in all fields. It will merely be useful as a source of references, but any information that it contains should be checked against the original publications. It will therefore be impossible to use this book alone, but its use will have to be combined with the use of other checklists, sometimes partial and older, some of which are devoid of bibliography, like that of GORHAM (1974). I wish here to insist on a point. GORHAM's (1974) checklist has been much criticized by several authors. Some of these criticisms were well-founded, and it is true that GORHAM's list is neither perfect nor complete. However it was the result of the work of a single man, without computer, and was nevertheless extremely useful. It is true that it contains mistakes and omissions, that it does not give citations of original descriptions, nor type specimens references, type localities or detailed distributions ; an important weakness of this book is that it has no index. However, experience has shown me that, with the help of GORHAM's list and of the *Zoological Record*, it is usually extremely easy and rapid to trace all the available information in these fields. Furthermore, GORHAM's book gives some important pieces of information (synonyms, homonyms and subspecies) which are not given in *ASW*, and it will therefore be necessary to combine the use of both books to have a comprehensive view of "the summary of the state of the literature of amphibian taxonomy" (*ASW* : 1). A book that would contain the information of both GORHAM's and FROST's books still remains to be written.

It is clear to me that all or most of the authors who have worked on the establishment of the *ASW* checklist made use of GORHAM's checklist, at least as a "starting point" for their compilation. If they have not, they have certainly lost time. For this reason, I feel that the introductions to *ASW* do not do enough justice to GORHAM's work, which is only mentioned incidentally and rather contemptuously on p. iii as being incomplete. Incomplete as it is, GORHAM's list has certainly rendered many services to amphibian taxinomists since its publication. It has also allowed the realization of quantitative analyses of the characteristics of the classification of the amphibians at the level of higher taxa (D-30) and of species and subspecies (D-4) ; the latter type of analysis, which takes into account the dates and current status (as valid species or subspecies, or as invalid synonyms, homonyms or replacement names) of all species-group names created for amphibians since 1758, would have been impossible on the basis of *ASW*.

GORHAM's checklist has also been criticized for having introduced new combinations, "none of which is supported by evidence" (DUELLMAN, 1977 : x). However, this is unavoidable in any checklist, and neither DUELLMAN's (1977) nor FROST's (1985) checklists are beyond this criticism. In *ASW*, new combinations which are not "support-

ed by evidence" appear for example in the genera *Rana* (African species of the subgenus *Hylarana*), *Tomopterna* (Asian species) and *Scutiger* (species transferred from the nominal genus *Oreolalax*). There is no way to avoid such actions in a checklist if this list is to be somewhat heterogeneous ; what is problematic here is the author who should be credited with these new combinations (see above). More open to criticism is the introduction in the *ASW* checklist of unjustified emendation, some of which, like *Rana quadrana* and *Rana unculuana*, are truly barbarian (see below).

CHOICE OF THE CLASSIFICATION

Systematics is not yet a unified discipline of biology. There still exist several schools of systematics, the most important ones of which are the phenetic, cladist and evolutionary ones (see e.g. MAYR, 1969, 1981, 1982). Taxinomists belonging to these three schools have different conceptions of how a classification should be constructed, of what is a "natural" taxon, etc. These three different schools each have supporters among current amphibian taxinomists. As these authors work on different groups of amphibians, they produce subclassifications of various subgroups of this class which, being based on different rationales, are not "compatible" and cannot be truly combined into a single classification. The building up of a checklist like *ASW* is thus difficult as concerns the choice of a classification. A possible approach would be to choose a single philosophy of classification and to produce a whole classification of the class under phenetic, cladist or evolutionary principles. Unfortunately, no such classification exists for amphibians (from the class category to the subspecies category), because a lot of relevant basic information on taxa is still lacking. At this point, any checklist of the amphibians of the world cannot but adopt an eclectic frame of classification. While the classification at the higher level may, at least partially (because of the gaps in the information), follow one of the three philosophies of classification, subclassifications of lower taxa will have to rely mainly on the most recent revisionary works, which may have been made according to different principles. This is unavoidable, but should be made clear in the introduction to the checklist.

In the *Introduction* of *ASW*, FROST (pp. 1-2) states that the philosophy retained in this respect has been to follow the most recent revisions. This is only partially true. In several cases, the most evident of which is the subfamily Raninae, the classification used in the book is a compromise between various conceptions of the classification of the group which have been defended by different authors in the recent years. It is not quite clear to me which principles have guided the authors in making these choices and compromises, since the philosophy of classification to which they adhere is not explicitly stated. However, from several remarks scattered throughout the book, I seem to conclude that they favor the cladist philosophy. What is extremely misleading however is that this philosophical choice is never explicited, but that in various parts of the book some of the cladist ideas are presented as universally agreed upon ideas. For example, the terms "monophyly" and "monophyletic" are used several times in the book, but without stating if this word is used in its traditional sense, as a qualification of taxa (ASHLOCK, 1971 ; MAYR, 1974, 1981 ; DUBOIS, D-30, D-33), or in its Hennigian sense, as a qualification of descent (WILEY, 1981). Confusion would have been spared if the authors had abandoned the equivocal term of "monophyletic" and used the well-defined term "holophyletic" (ASHLOCK, 1971) ; for "monophyletic" in the traditional sense, I recently proposed the new term "homophyletic" (D-33), in the hope to stop a long period of confusion.

Other examples of the "cryptic" use of a cladist philosophy in this book can be found : e.g. the assumption that sister groups should automatically be given the same rank in taxinomic hierarchies (see e.g. SIBLEY & AHLQUIST, 1982 : 13), or the idea that paraphyletic groups are not "natural" taxa. This later idea is even pushed extremely far in a sentence like : "This 'group' is likely paraphyletic with respect to the Mantellinae and through that group to the Rhacophoridae." (*ASW* : 451). By putting the word group between quotation marks in this sentence, the authors seem to imply that a paraphyletic group is not a group, which is philosophically inadmissible ! A group may be natural or not, homophyletic, holophyletic, polyphyletic or paraphyletic, it is nevertheless a group : even a group consisting of "all black animals" would be a real group, even if it does not correspond to a phylogenetic unit.

The author of these lines adheres to the evolutionary school of MAYR (1969, 1974, 1981), as explained in several papers (D-11, D-12, D-14, D-30, D-33), and he considers that sister groups should not automatically be given the same rank in classification, that paraphyletic groups may, in some cases, be perfectly natural groups, and that the building up of a classification should take into account not only the cladistic relationships between taxa but also the amount of genetic, phenetic and ecological divergence which has occurred between taxa after the cladogenesis which separated the lineages from which they are issued. Such a conception, which relies both on phylogeny and on divergence, is "synthetic" or "evolutionary", not "gradist", as stated in *ASW* (p. 452), because a purely gradist approach to classification would take into account only ecological differences between taxa, without considering their phylogeny.

Divergences of opinion on the "best" system of classification are normal in the present state of the theory of systematics, and it is the full right of any taxinomist to adhere to a philosophy of classification of his choice, but such choices should be stated clearly. Otherwise, the risk is to present as universal truths ideas which are only the matter of personal opinions, and this is contrary to science.

Not all groups of Amphibia have been subject to recent revisionary works using modern concepts and methods of analysis, and this makes unavoidable the presence of important heterogeneities in such a list. Some of these heterogeneities, however, are due to the compromise which has been tempted in some cases between quite different concepts of the classification of a group. In such cases it would have been better to choose one of these options (and to clearly mention this choice) rather than to try an impossible compromise. A few examples may be mentioned in this respect. Among the subfamily Megophryinae of the Pelobatidae, if full generic rank is to be given to *Atympanophrys* and *Brachytarsophrys*, it should certainly also be given to *Ophryophryne*, which is much more divergent than the latter two groups from *Megophrys* ; if *Ophryophryne* is to be maintained as a subgenus of *Megophrys*, then these two former groups should be considered as simple synonyms of *Megophrys* (see e.g. D-35). The classification retained for the Raninae is extremely heterogeneous. If full generic rank is given to taxa like *Hildebrandtia*, *Ptychadena*, *Lanzarana*, *Pyxicephalus*, *Aubria*, *Tomopterna*, *Strongylopus*, *Altirana* and *Nanorana*, it should also be given to several of the subgenera or even species groups maintained in the genus *Rana* in *ASW* (see e.g. D-35). There is a striking discrepancy in the checklist between the few cases where small, sometimes monotypic, genera have recently been established, often as a result of a strict application of the cladist principles, such

as the "genera" *Baleaphryne, Lanzarana, Strongylopus, Atympanophrys, Brachytarsophrys, Kassinula, Tornierella*, and other cases where large and clearly heterogeneous "genera" are maintained as such, sometimes with a subdivision in subgenera or species groups (*Bufo, Hyla, Litoria, Eleutherodactylus, Rana, Bolitoglossa*, etc.), but even sometimes without such a subdivision : the most extreme example in the latter case is the "genus" *Mantidactylus*, where the 10 species groups recognized by BLOMMERS-SCHLÖSSER (1979) are not even mentioned, although this genus is clearly heterogeneous and corresponds to a number of "genera" of the kind of *Baleaphryne* or *Lanzarana*.

Such problems clearly show that we are still far from having a unified, homogeneous frame of classification for all amphibians of the world, from the lowest to the highest taxa. This is rather exciting for the future, and it is likely that the classification which appears in the first edition of *ASW* will undergo severe modifications in the years to come.

SPECIFIC COMMENTS

Before starting with these detailed comments, I wish to make a few preliminary remarks. In what follows, I shall discuss at some length various points which may be considered as relatively minor, if not fully trivial, such as the publication dates of some names, the authors of these names, their first page of appearance, etc. This should not be interpreted as an evidence that I consider these details of utmost importance in systematics. The most important part of taxinomic research is by far the biological study of organisms and of all aspects of their relationships, in order to build up a classification in agreement with our knowledge of the evolution of these organisms. The nomenclatural aspect of classification, which is not biology, is only a minor complement to this scientific work. Nomenclature bears to biological classification the same relationship as grammar and orthography to literature : the literary value of a book does not lie in its absence of grammatical or orthographic mistakes, but the presence of such mistakes usually makes the publication of a book simply impossible ! The reluctance of most systematists to take care of nomenclatural rules in their work is to my mind of the same kind as would be the reluctance of a novelist or a poet to follow the rules of language, which in many respects are sometimes as arbitrary and disputable as the rules of zoological nomenclature, but which impose their strength of law to all humans who want to communicate by printed ways.

Many systematists claim not to be interested in nomenclature, and prefer to work only on "biological problems", leaving to other, supposedly less creative, taxinomists, the care of nomenclatural problems. This is their full right. But when systematists work on a checklist which is proposed to "serve as a standard reference to amphibian nomenclature", one may expect that they don't have such contempt for nomenclatural problems. Furthermore, in a checklist, various degrees of precision may be chosen, but, at the level retained, information must be carefully checked before being published. For example, in most works dealing with amphibians systematics and faunistics published until now, the family-group names are given without their authors and dates, and even more without the precise reference of their first publication (including the page and the original name); books and papers giving such details are extremely rare (see D-26 : 5). As long as the family-group names given are the valid ones however, such absence of details is not a major deficiency ; but insofar as a book gives authors, dates, bibliographic references,

pages, original spellings of names, references of first uses of emended spellings, modes of designation of type species of genera, etc., these problems should be treated seriously. It is also perfectly possible, e.g. to save space, to build up a very useful checklist without including bibliographic references to original publications of scientific names : with the authors and dates of the names, it is a relatively easy task to find the original references, as outlined above. But if citations, and first pages of publication of names, are to be given in a checklist, the references should be given in full (including title of the paper or book and its complete pagination), and the first pages of publications of names should be checked carefully.

The *ASW* checklist is an ambitious book. It attempts to give in a limited space many different kinds of information (taxinomic, nomenclatural, biogeographic, evolutionary). This makes the "venture", as it calls itself, quite exciting. However, this calls also for more stringent criticism. The *ASW* list aims at giving not only the valid names of taxa, their authors and dates, but also the authors and dates of the justified emendations, and all the relevant bibliographic references. If all this information is to be added, this needs a considerable amount of additional work to produce a list with an acceptable rate of errors. On the other hand, if adding all this information increases significantly the rate of errors, the overall quality and usefulness of the book won't be higher. This is unfortunately the case of *ASW*. Although it has included among it aims to give all these seemingly minor details, the verification work has not been carefully done. This is shown by the presence in the book of numerous mistakes of various kinds, concerning namely : valid names of the taxa (in the class-group, family-group, genus-group and species-group); authors, dates, references and pages of first publications of names ; original spellings of names ; authors, dates, references and pages of first publications of emended spellings of names ; type species of genera and subgenera ; modes of designation of type species of genera and subgenera ; type specimens of species ; type localities of species ; distributions of species ; and comments. These types of errors will be analyzed in detail below.

I shall also attempt to estimate the quantitative weight of such mistakes in the book, with the following ideas in mind. It is certainly impossible for anyone, or any group of persons, to build up a completely perfect checklist. Mistakes and omissions will inevitably persist in any similar monumental work, although successive reeditions of such a book, taking advantage of the various comments received from colleagues worldwide, are liable to reduce significantly the rate of mistakes and omissions. The question one can ask is : what rate of mistakes and omissions is acceptable in the first edition of such a list ? By "acceptable", I mean, wich makes the publication of the list worthwhile, useful to the international scientific community, and worthy to "serve as a standard reference to amphibian nomenclature". I would suggest that the acceptable rate should be fixed at one of the usual levels of mistakes (in measurement, for example) in biological works, i.e. 0.05, 0.01 or 0.001. Considering the difficulty of the establishment of such a checklist, I suggest the highest level, 0.05, should be considered as the maximum rate of errors and omissions ("EO rate") "acceptable" in such a work. In what follows, however, it will be shown that this "acceptable" rate is exceeded in several cases in the *ASW* checklist, thus making the value of its publication, in its present state, questionable.

Obviously, the following mistakes and omissions are considered in relation to the status of amphibian taxinomic literature *in early June 1984*, the date of completion of

Table I. — Correct names of class-group (sensu DUBOIS, D-26) and family-group taxa of Amphibia for which the names given in *ASW* are incorrect.

Name, author and date which appear in *ASW*	Correct information	
	Correct name, author and date	References
Class-group taxa :		
Caudata Oppel, 1811 (order)	Caudata Scopoli, 1777 (super-order) / Urodela Rafinesque, 1815 (order)	D-26, D-29
Lissamphibia * (subclass)	Batrachia Brongniart, 1800 (subclass)	D-19, D-26, D-29
Family group taxa :		
Caecilidae / -inae Gray, 1825	Cecilidae / -inae Rafinesque-Schmaltz, 1814	D-25, D-29
Dermophiidae / -inae Taylor, 1969	Siphonopidae / -inae Bonaparte, 1850	D-25, D-29
Grypiscini *	Cycloramphini Bonaparte, 1850	D-19, D-25, D-29
Hemidactylini *	Mycetoglossini Bonaparte, 1850	D-25, D-29
Ichthyophiidae / -inae Taylor, 1968	Epicriidae / -inae Fitzinger, 1843	D-25, D-29
Petropedetinae Noble, 1931	Phrynobatrachinae Laurent, 1940 (1878)	D-16, D-19, D-26, D-29
Xenopodinae Fitzinger, 1843	Dactylethrinae Hogg, 1838	D-19, D-26, D-29

* *ASW* provides neither author nor date for this name.

the manuscript. Since then, new species and genera have been described, new data published on already known taxa and on nomenclatural problems, but these will hopefully be included in the next edition of *ASW*.

VALID NAMES OF THE TAXA, WITH THEIR CORRECT AUTHORS, SPELLINGS, DATES, REFERENCES AND PAGES OF PUBLICATION

In the class-group

Fourteen names of the class-group (as defined by DUBOIS, D-26) are mentioned in *ASW*, 11 of which are considered valid in this book. Of these, 2 are credited with incorrect names (see Table I), 12 are either credited with incorrect authors and dates or with no author and date (see Table II), and 6 with incorrect spellings (see Table III). The EO rates for these different types of information are thus respectively 14.3 %, 85.7 % and 42.9 %. For more detailed discussions of the valid names of these taxa, see D-25, D-26 and D-29.

In the family-group

For the names of this group, we shall consider independently the information concerning the names themselves, and concerning the various spellings taken by these names.

Table I gives a list of names of the family-group mentioned in *ASW* which are incorrect, with the valid corresponding names. Out of a total of 97 family-group names mentioned in the book, 7 are wrong (EO rate 7.2 %). Table II gives a list of the family-group names which are credited with incorrect authors and dates in *ASW* or for which

Table II. — Correct authors and dates of the class-group (sensu DUBOIS, D-26) and family-group names of Amphibia mentioned in *ASW* but for which this information is either incorrect or lacking. The names as given in the first column appear under the spelling which they bear in *ASW*, and which in some cases is incorrect (see Table III).

Name which appears in *ASW*	Author and date mentioned in *ASW*	Correct information	
		Correct author and date	References
Class-group names :			
Ambystomatoidea	*	Noble, 1931	D-25, D-29
Amphiumoidea	*	Cope, 1888	D-29
Apoda °	*	Merrem, 1820	D-25
Caudata	Oppel, 1811	Scopoli, 1777	D-26, D-29
Cryptobranchoidea	*	Bonaparte, 1832	D-25, D-29
Gymnophiona	Müller, 1831	Rafinesque-Schmaltz, 1814	D-25, D-29
Lissamphibia	*	Haeckel, 1866	D-19, D-26
Meantes °	*	Linnaeus, 1767	D-41
Plethodontoidea	*	Smith & Taylor, 1948	D-29
Proteoidea	*	Müller, 1831	D-25, D-29
Salamandroidea	*	Müller, 1831	D-25, D-29
Trachystomata	*	Cope, 1866	D-41
Family-group names :			
Allophrynidae °	"Nomen nudum"	Goin, Goin & Zug, 1978	D-31
Alsodini °	*	Mivart, 1869	D-19, D-26
Ambystomatidae	Hallowell, 1858	Gray, 1850	D-34
Ascaphidae °	*	Fejérváry, 1923	D-19, D-26
Asterophryinae	Günther, 1859 "1858"	Günther, 1858	D-19, D-26, D-29
Atelopodidae °	*	Fitzinger, 1843	D-19, D-26, D-29
Batrachylini	*	Gallardo, 1965	D-19, D-26, D-29
Bolitoglossini	*	Hallowell, 1856	D-29
Bombinatoridae °	*	Gray, 1825	D-19, D-26, D-29
Bombinidae °	*	Fejérváry, 1921	D-19, D-26
Brachycephalidae	Günther, 1859 "1858"	Günther, 1858	D-19, D-26, D-29
Calyptocephalellini	*	Reig, 1960	D-19, D-26, D-29
Cycloraninae °	*	Parker, 1940	D-19, D-26
Dendrobatidae	Cope, 1865	Cope, 1865 (1850)	D-18, D-19, D-26, D-29
Dermophiinae	Taylor, 1969 b	Taylor, 1969 a	D-41
Desmognathidae / -inae	Cope, 1859	Gray, 1850	D-34
Discoglossidae	Günther, 1859 "1858"	Günther, 1858 (1845)	D-35
Eleutherodactylini	*	Lutz, 1954	D-19, D-26, D-29
Elosiinae °	Miranda-Ribeiro, 1926	Miranda-Ribeiro, 1923	D-19, D-26
Gripiscini	*	Mivart, 1869	D-19, D-26
Hemidactylini	*	Hallowell, 1856	D-25
Herpelinae	*	Laurent, 1984	D-29
Hylidae / -inae	Gray, 1825 (1815)	Rafinesque, 1815	D-29

Hylodinae	Günther, 1859 "1858"	Günther, 1858	D-19, D-26, D-29
Hynobiidae	Cope, 1860 "1859"	Cope, 1859 (1856)	D-25, D-29
Leptobrachiinae °	*	Dubois, 1980	D-19, D-26, D-29
Limnodynastinae	Lynch, 1971	Lynch, 1969	D-19, D-26, D-29
Megophryinae	Noble, 1931	Bonaparte, 1850	D-19, D-26, D-29
Microhylidae / -inae	Günther, 1859 "1858" (1843)	Günther, 1858 (1843)	D-19, D-26, D-29
Odontophrynini	*	Lynch, 1969	D-19, D-26, D-29
Pelodryadidae / -inae	Günther, 1859 "1858"	Günther, 1858	D-19, D-26, D-29
Phyllomedusidae / -inae	Günther, 1859 "1858"	Günther, 1858	D-19, D-26, D-29
Polypedatidae °	Günther, 1859 "1858"	Günther, 1858	D-19, D-26
Ranidae / -inae	Gray, 1825	Rafinesque-Schmaltz, 1814	D-19, D-26, D-29
Rhacophoridae / -inae	Hoffman, 1932 (1859)	Hoffman, 1932 (1858)	D-19, D-26, D-29
Rhinophrynidae	Günther, 1859 "1858"	Günther, 1858	D-19, D-26, D-29
Salamandridae	Gray, 1825	Goldfuss, 1820	D-29
Scaphiopodidae / -inae °	*	Cope, 1865	D-19, D-26, D-29
Scolecomorphidae	Taylor, 1969 b	Taylor, 1969 a	D-41

★ *ASW* provides neither author nor date for this name
° name mentioned in *ASW*, but as an invalid name

this information is lacking, with the correct corresponding information. These number 39 (EO rate 40.2 %).

Some of the corrections here proposed deserve a more detailed discussion.

A few mistakes only bear upon the authors and publication dates of names. Among them, particulary noticeable are the family-group names due to Albert GÜNTHER, and which are credited in *ASW* to Günther, 1859 "1858", because the *Catalogue of the Batrachia Salientia in the Collection of the British Museum*, although dated 1858, was in fact published on 12 February 1859 (SHERBORN, 1934). However, as I had already noted (D-18, D-19, D-26, D-29), prior to the publication of his *Catalogue*, GÜNTHER had written a paper entitled "On the systematic arrangement of the tailless Batrachians and the structure of *Rhinophrynus dorsalis*", which had been read at the meeting of 22 June 1858 of the Zoological Society of London, and published on pages 339-352 of the 1858 volume of the *Proceedings* of this Society, which were published on 9 November 1858 (SCLATER, 1893). In this paper, GÜNTHER gave a preliminary account of the classification of the anurans to be used in his *Catalogue*, with the names of all the suprageneric taxa to appear there ; all these names being accompanied in this paper by clear diagnoses, they are nomenclaturally valid as of 9 November 1858, and all these names should now be quoted as of Günther, 1858, not Günther, 1859 "1858".

In Urodela, it should be noted that I recently discovered that several family-group names created by GRAY (1850) have been overlooked by all subsequent authors (see D-34).

A few other problems arise from the recent rediscovery of previously overlooked senior synonyms of family-group names currently considered valid (D-11, D-16, D-18, D-19, D-25, D-26, D-29, D-32, D-35, D-39). A preliminary remark is necessary here. When my bibliographic research led me to the rediscovery of all these older names, I had the choice between two attitudes. The first one, certainly the simpliest and less time-consuming of both, would have been to follow a single rule in all of these cases (either

Table III. — Correct spellings of the class-group (sensu DUBOIS, D-26) and family-group names mentioned in *ASW* under incorrect spellings.

Spelling which appears in *ASW*	Correct information	
	Correct spelling	References
Class-group names :		
Ambystomatoidea	Ambystomatoidei	D-25, D-29
Amphiumoidea	Amphiumoidei	D-29
Cryptobranchoidea	Cryptobranchoidei	D-25, D-29
Plethodontoidea	Plethodontoidei	D-41
Proteoidea	Proteoidei	D-25, D-29
Salamandroidea	Salamandroidei	D-25, D-29
Family-group names :		
Hemidactylini	Hemidactyliini	D-25

to decide to simply follow the Principle of Priority ; or to decide to ask the ICZN to suppress collectively all these older synonyms — as was for example done by MERTENS & WERMUTH (1960) for eleven specific names of Amphibia and Reptilia). The second attitude, which was chosen, was to study all these cases individually, and to treat them differently according to the precise situation encountered in each of them. Thus, in several cases, it was simply decided to follow the Principle of Priority, because the nomenclatural disturbance was appreciated as minor ; this has led to the replacement of Bombininae by Bombinatorinae, of Xenopodinae by Dactylethrinae, of Grypiscini by Cycloramphini, of Elosiinae by Hylodinae, of Sphenophryninae by Genyophryninae, of Hemidactyliini by Mycetoglossini, of Triturinae by Molginae, of Ichthyophiidae by Epicriidae and of Dermophiidae by Siphonopidae. In a few other cases, application of Art. 40 of the *Code* has allowed the conservation of some junior synonyms having "won general acceptance" : Leptodactylidae, Microhylidae, Rhacophoridae, Hynobiidae. Following certain changes introduced in the new edition of the *Code (*ANONYMOUS, 1985 a) in its Art. 32, 35 and 39, changes which are open to criticism (see D-29), some names are conserved but take the date of an older name, based on an unjustified emendation of a generic name : Pipidae, Megophryinae, Cycloramphini, Hylidae, Microhylidae, Ranidae (see DUBOIS, D-29, who had overlooked Microhylidae as being in this case). Finally, a few names raise special, more important problems, and need special discussions.

I wish first to underline the fact that I consider the *Code* as having a strong legislative value in nomenclature, not only an indicative meaning. In other words, I think exceptions to the Rules should be accepted only exceptionally, as seems obvious. Appeal to the ICZN to use its Plenary Powers to suspend such or such Rule of the *Code* should be restricted to the few cases when the nomenclatural disturbance entailed by the simple application of the Rules would really be important, and should not be made in every case where a name, which has been used for only a few dozen years and in only a few

dozen publications, should be replaced by an older one. In this respect, I consider that the conditions given in Art. 79 (c) (2) of the *Code*, which requires that a name has been used "by at least 5 different authors and in at least 10 publications" during the immediately preceding fifty years, in order to show that "stability is threatened", are not stringent enough. I would personally favor higher values, say 10 or 20 different authors and at least 50 or even 100 publications. These principles have guided me in the actions I have taken regarding family-group nomenclature of Amphibia.

The first name to raise important nomenclatural problems in this class is that of Discoglossidae : it was discussed in detail elsewhere (D-35).

The second important problem is that raised by the name Dendrobatidae, which was also discussed in detail elsewhere (D-18, D-21).

The third problem is related to the use of the names Hemimantinae Hoffmann, 1878, Petropedetinae Noble, 1931 and Phrynobatrachinae Laurent, 1940. Strict application of the Rules in this case would require retention of the first of these names for this subfamily. Since this name is based on a generic name (*Hemimantis* Peters, 1863) which is a junior subjective synonym of a widely used generic name (*Phrynobatrachus* Günther, 1862), I considered an action of the ICZN was necessary. For several reasons, in particular the fact that the name Phrynobatrachinae had been a little more used than the name Petropedetinae, I suggested that the Commission should make use of its Plenary Powers to rule that the family-group name Phrynobatrachinae is to be cited as of "Laurent, 1940 (1878)", and that it has priority over the family-group name Hemimantidae Hoffmann, 1878. This application, although published several years ago (D-16), has still not yet been voted upon. Despite this application, the choice made in *ASW* was to use the name Petropedetinae for this subfamily. It is stated in this list that FROST and LYNCH, responsible for this choice, "disagree with this petition and see the situation as identical to that with Genyophryninae Boulenger, 1890, *vs.* Sphenophryninae Noble, 1931, one of simple priority" (*ASW* : 439). This is simply not true, because if "simple priority" is to be followed, the subfamily should be called Hemimantinae Hoffmann, 1878. Contrary to what is stated in *ASW*, Art. 40 of the *Code* cannot be called upon in this case, because *Hemimantis* is not a synonym of *Petropedetes* but of *Phrynobatrachus*, because LAURENT (1940) was not aware of the existence of the name Hemimantidae Hoffmann, 1878, and finally because neither the name Petropedetinae nor the name Phrynobatrachinae can be considered as having "won general acceptance" (see D-16). In the original application, I had mentioned 21 uses of the first name against 10 uses of the second one after 1940. To these figures, I can now add 14 references to uses of the name Phrynobatrachinae (BOGART & TANDY,1981 ; DUBOIS, D-11, D-19, D-26, D-29, D-35 ; MORESCALCHI, 1981 ; NUSSBAUM, 1982 ; DREWES, 1984 ; LAURENT, 1980 b, 1984 b, 1986 a ; PERRET, 1984 ; POYNTON & BROADLEY, 1985 ; LAURENT & FABREZI, 1986), but only one to use of the name Petropedetinae (BLOMMERS-SCHLÖSSER, 1981). This argument strengthens the case for the selection of the first of these names rather than the second one for this subfamily, which has been presented in more detail in my previous paper (D-16 : 137-138). At any rate this case must be voted upon by the ICZN, and no individual taxinomist can solve this problem by himself.

The next problem is that raised by the names Dactylethridae Hogg, 1838 and Xenopoda Fitzinger, 1843. DUBOIS (D-19, D-26, D-29) pointed to the priority of the first of

these names over the second, and estimated that, the second one having been used only very little, it was not justified in this case to call upon Art. 40 to conserve it (D-26 : 27). The authors of the *ASW* list took a different position, and wrote that "the incorrect group name Xenopinae has had widespread use" (*ASW* : 425), but they provided no evidence for that statement (no list of references, not even a number of references), and they presented "Xenopodinae Fitzinger, 1843" as the valid name for the subfamily. First of all, it should be noted that if this name was to be conserved by virtue of Art. 40, it would take the date of the replaced name, and thus be written "Xenopodinae Fitzinger, 1843 (1838)". Furthermore, this case is clearly one which corresponds with the situation described as follows in Art. 40 (b) (ii) of the *Code* : "In the event of divergent interpretations of the expression 'general acceptance', the case is to be referred to the Commission for a decision." In the present case, I consider the name Xenopodinae (or its unjustified emendations) to have had only a very limited use, not wider than the use of the name Dactylethrinae, which has priority. Most authors until now have only used the family-group name Pipidae, and only a minority of authors have divided this family into subfamilies. Strict application of the *Code* requires in this case to follow the principle of priority. In the case where one author or several would believe that the name Xenopodinae should be given priority over Dactylethrinae, he or they should submit an application to the ICZN for a decision, and provide evidence that the stability of nomenclature is threatened by the simple respect of the *Code*. Unless, or until, such an action is taken, and followed by a decision of the Commission, the valid name for this subfamily remains Dactylethrinae Hogg, 1838. The same holds true for all the other cases listed above where the nomenclatural disturbance is, in my opinion, minor, and where I replaced recent names by older synonyms. In particular, the family-group name Hylodinae was resurrected by DUBOIS (D-19, D-26, D-29), who gave (D-26 : 32) an extensive nomenclatural discussion of the names *Hylodes* Fitzinger, 1826, "*Hylodes* Fitzinger, 1843", Hylodidae Günther, 1858, and Elosiidae Miranda-Ribeiro, 1923 (not 1926, as erroneously stated in *ASW*), which should be consulted in addition to the quite incomplete discussion given in *ASW* (pp. 236-237).

The case of the names Caeciliidae Gray, 1825 and Ceciliidae Rafinesque-Schmaltz, 1814 was discussed in detail elsewhere (D-25, D-29, D-32).

A few words must be said about the name Allophrynidae, which the *ASW* rejects as having no status in nomenclature : as shown elsewhere (D-31), it is true that this name is a nomen nudum in the paper of SAVAGE (1973), but not in the book of GOIN, GOIN & ZUG (1978), who are therefore the authors, in the nomenclatural sense of the term, of this family-group name. LAURENT (1980 a, 1986 a) gave good arguments for the inclusion of the genus *Allophryne* in the family Bufonidae, where it seems best to place it in its own subfamily Allophryninae (D-19, D-26, D-29, D-31 ; LAURENT, 1986 b).

Besides these mistakes, some omissions bear on the actions of first revisors who chose between two family-group names published contemporaneously. One of these first-revisor actions is mentioned in *ASW* (p. 439, for the names Petropedetinae Noble, 1931 and Cacosterninae Noble, 1931), but the following ones are not (see D-26) : the priority of Leptodactylidae Werner, 1896 (1838) over Ceratophryidae Tschudi, 1838 rests on the first revisor action of COPE (1866), who gave priority to Cystignathi Tschudi, 1838 over Ceratophrydes Tschudi, 1838 ; the priority of Microhylidae Günther, 1858 (1843) over Kaloulidae Noble, 1931 (1843) rests on the first revisor action of PARKER (1934), who

gave priority to Gastrophrynae Fitzinger, 1843 over Hylaedactyli Fitzinger, 1843 ; the priority of Brevicipitinae Bonaparte, 1850 over Engystomatinae Bonaparte, 1850 rests on the first revisor action of DUBOIS (D-19, D-26) ; the priority of Melanobatrachinae Noble, 1931 over Hoplophryninae Noble, 1931 was fixed by the first revisor action of PARKER (1934) ; the priority of Pelobatidae Bonaparte, 1850 over Megophryidae Bonaparte, 1850 rests on the first revisor action of DUBOIS (D-19, D-26), who gave priority to Pelobatidae Bonaparte, 1850 over Megalophreidina Bonaparte, 1850 ; the priority of Dicamptodontidae Tihen, 1958 over Rhyacotritonidae Tihen, 1958 was fixed by the first revisor action of REGAL (1966).

Let us now look at the information concerning the spellings of family-group names given in *ASW*. 131 such spellings are mentioned in the book. Except for one name (Table III), the spelling used in the checklist is correct (EO rate 0.8 %). The rate of errors and omissions is much higher however as concerns the reference to the first use of the justified emendation of family-group names currently in use. There is no general rule about giving or not the authors and references to these first uses of justified emendations in *ASW*. In some cases no information is given, in some others the correct information is given, in other ones an incorrect information appears. Table IV gives the correct information in this respect for the spellings for which *ASW* provides either no information or an incorrect one. The total number of spellings in this case being 102, for a total of 131 spellings, the total EO rate for this information is 77.9 %.

Let us note in passing that the presentation chosen for this information in *ASW* is particularly cumbersome and space inefficient. This is clearly shown, for example, by the case of the names Arthroleptidae and Arthroleptinae, for which *ASW* (p. 14) writes :

"FAMILY : Arthroleptidae Mivart, 1869. (...) *Comment* : As originally formed, the group name was Arthroleptina ; the first use of the group name Arthroleptidae was by Dubois, 1981, Monit. Zool. Ital., N.S., Suppl. 15 : 259. (...)

SUBFAMILY : Arthroleptinae Mivart, 1869. (...) *Comment* : The original spelling of the group name was Arthroleptina ; the first use of the justified emendation Arthroleptinae was by Noble, 1931, Biol. Amph. : 515."

This mode of notation is much heavier than that adopted e.g. by DUBOIS (D-11, D-26), which gives exactly the same type of information in three lines, under the form of a synonymy :

"Arthroleptina Mivart, 1869 : 294. - Genre-type : *Arthroleptis* Smith, 1949.
Arthroleptinae : NOBLE, 1931 : 515.
Arthroleptidae : LAURENT, 1972 : 200."

To save space, the same information could also be presented as follows : "Arthroleptina Mivart, 1869 : 294. / Arthroleptinae : NOBLE, 1931 : 515. / Arthroleptidae : LAURENT, 1972 : 200."

This type of information (on the first authors to have used the justified emendation of a given name) may be considered trivial, but is necessary if one wants to present family-group names, with their correct spellings, under the mode of presentation suggested and used by SMITH & SMITH (1980) and modified by DUBOIS (D-35). Under such a mode of notation, the two family-group names here in question should be written as follows : Arthroleptidae Mivart, 1869 (Laurent, 1972) ; Arthroleptinae Mivart, 1869 (Noble,

Table IV. — Correct reference to the first use of the correct spelling of the family-group names mentioned in *ASW* but for which this information is either incorrect or lacking.

Correct spelling of the family-group name	First use of the correct spelling as given in *ASW*	Correct information	
		Real first use of the correct spelling	References
Allophrynidae °	*	Goin, Goin & Zug, 1978 : 224	D-31
Alsodini °	*	Lynch, 1969 : 3	D-26
Alytidae °	Günther, 1859 "1858" : 37	Günther, 1858 : 346	D-26
Ambystomatidae	Tihen, 1958 : 20	Stejneger, 1907 : 24	D-41
Amphignathodontinae °	*	Gadow, 1901 : 139	D-26
Amphiumidae	*	Gray, 1825 : 216	D-41
Arthroleptidae	Dubois, D-11 : 259	Laurent, 1972 : 200	D-11, D-26
Ascaphidae °	*	Fejérváry, 1923 : 178	D-26
Asterophryinae	*	Fejérváry, 1923 : 181	D-26
Astylosterninae	*	Noble, 1927 : 110	D-11, D-26
Atelopodidae °	*	Parker, 1934 : 8	D-26
Batrachylini	*	Lynch, 1971 : 123	D-26
Bolitoglossini	*	Wake, 1966 : vi	D-41
Bombinatoridae °	*	Gray, 1831 : 38	D-26
Bombinidae °	*	Tatarinov, 1964 : 126	D-26
Brachycephalidae	*	Günther, 1858 : 346	D-26
Breviciptinae	*	Van Kampen, 1923 : x	D-26
Cacosterninae °	*	Noble, 1931 : 527	D-11, D-16, D-26
Caecilidae	*	Bonaparte, 1850	D-41
Caeciliinae	Taylor, 1969 b : 604	Taylor, 1969 a : 303	D-41
Calyptocephalellini	*	Lynch, 1978 : 42	D-26
Centrolenidae	*	Taylor, 1951 : 36	D-26
Ceratophryidae °	*	Parker, 1933 : 12	D-26
Ceratophryinae	*	Parker, 1935 : 511	D-26
Cryptobranchidae	*	Cope, 1889 : 18	D-41
Cycloraninae °	*	Parker, 1940 : 2	D-26
Cystignathidae °	*	Günther, 1858 : 346	D-26
Dactylethrinae °	*	Metcalf, 1923 : 391	D-26
Dendrobatidae	*	Cope, 1865 : 100	D-18, D-26
Dermophiidae °	*	Laurent, 1984 a : 199	D-41
Dermophiinae	*	Laurent, 1984 a : 199	D-41
Desmognathinae	*	Boulenger, 1882 b : viii	D-41
Discoglossidae	Günther, 1859 "1858" : 37	Günther, 1858 : 346	D-26
Dyscophinae	*	Gadow, 1901 : 139	D-26
Eleutherodactylini	*	Lynch, 1969 : 3	D-26
Elosiinae °	*	Lutz, 1930 : 195	D-26
Genyophryninae	Dubois, D-19 : 274	Gadow, 1901 : 139	D-26
Grypiscini	*	Lynch, 1969 : 3	D-26
Heleophrynidae	*	Hoffman, 1935 : 2	D-26
Hemidactyliini	*	Wake, 1966 : vi	D-41
Hemisidae	Laurent, "1979" [1980 a] : 417	Cope, 1867 : 198	D-11, D-26
Herpelinae °	*	Laurent, 1984 a : 199	D-41

Hoplophryninae °	*	Noble, 1931 : 539	D-26
Hylidae	*	Bonaparte, 1850	D-26
Hylinae	*	Gadow, 1901 : 139	D-26
Hylodinae	*	Savage, 1973 : 354	D-26
Hynobiidae	*	Cope, 1866 : 103	D-41
Hyperoliini °	*	Laurent, 1972 : 201	D-26
Ichthyophiidae	*	Taylor, 1968 : x	D-41
Ichthyophiinae	*	Nussbaum, 1979 : 13	D-41
Kassininae	*	Dubois, D-11 . 227	D-11, D-26
Leptobrachiinae °	*	Dubois, D-19 : 272	D-26
Leptodactylinae	Noble, 1931 : 504	Metcalf, 1923 272	D-26
Leptopelinae	*	Dubois, D-11 : 227	D-11, D-26
Limnodynastinae	*	Heyer & Liem, 1976 : 5	D-26
Mantellinae	*	Laurent, 1946 : 336	D-26
Megophryinae	*	Noble, 1931 : 492	D-26
Melanobatrachinae	*	Noble, 1931 : 538	D-26
Micrhylidae °	Günther, 1859 "1858" . 121	Günther, 1858 : 346	D-26
Myobatrachidae	*	Schlegel, 1850 : 10	D-26
Odontophrynini	*	Lynch, 1973 . 497	D-26
Pelobatidae	Lataste, 1879 : 761	Bonaparte, 1850	D-26
Pelodryadidae °	Günther, 1859 "1858" : 119	Günther, 1858 : 346	D-26
Pelodryadinae	Duellman, 1977 · 1-225	Dowling & Duellman, 1978 · 37.1	D-26
Pelodytidae	*	Bonaparte, 1850	D-26
Pelodytinae °	*	Fejérváry, 1923 : 181	D-26
Petropedetinae	*	Noble, 1931 : 520	D-11, D-16, D-26
Philautinae	*	Dubois, D-11 · 227	D-11, D-26
Phrynobatrachinae °	*	Laurent, 1940 : 79	D-11, D-16, D-26
Phrynomeridae °	*	Parker, 1934 : 9	D-26
Phrynomerinae	*	Noble, 1931 · 538	D-26
Phyllobatidae °	*	Parker, 1933 : 12	D-18, D-26
Phyllomedusidae °	Günther, 1859 "1858" : 120	Günther, 1858 : 346	D-26
Phyllomedusinae	*	Miranda-Ribeiro, 1926 · 64	D-26
Pipidae	*	Swainson, 1839 : 88	D-26
Pipinae	Noble, 1931 : 491	Metcalf, 1923 : 3	D-26
Platymantinae °	*	Savage, 1973 : 354	D-26
Plethodontidae	*	Gray, 1850 : 5	D-41
Plethodontinae	*	Boulenger, 1882 b : vii	D-41
Plethodontini	*	Wake, 1966 : vi	D-41
Polypedatidae °	*	Günther, 1858 : 346	D-26
Proteidae	*	Hogg, 1838 : 152	D-41
Pseudidae	*	Savage & Carvalho, 1953 . 198	D-26
Ranidae	Bonaparte, 1831 : 66	Boie, 1828 : 363	D-26
Raninae	*	Boulenger, 1888 : 205	D-26
Rhacophoridae	*	Hoffman, 1932 : 562	D-11, D-26
Rhinatrematidae	*	Nussbaum, 1977 : 1	D-41
Rhinodermatidae	*	Günther, 1858 : 346	D-26
Rhinophrynidae	*	Günther, 1858 : 348	D-26
Rhyacotritoninae	*	Tihen, 1958 : 1	D-41
Salamandridae	*	Gray, 1825 · 215	D-41

Table IV. — (continued) Correct reference to the first use of the correct spelling of the family-group names mentioned in *ASW* but for which this information is either incorrect or lacking.

Scaphiophryninae	*	Laurent, 1946 : 337	D-26
Scaphiopodidae °	*	Cope, 1865 : 104	D-26
Scaphiopodinae °	*	Dubois, D-19 271	D-26
Scolecomorphidae	*	Taylor, 1969 a : 297	D-41
Sirenidae	*	Gray, 1825 · 215	D-41
Sphenophryninae °	*	Noble, 1931 . 531	D-26
Telmatobiidae °	Miranda-Ribeiro, 1926 : 12	Miranda-Ribeiro, 1920 : 320	D-26
Telmatobiini	*	Lynch, 1969 : 3	D-26
Typhlonectidae	*	Taylor, 1968 . xi	D-41
Uraeotyphlinae	*	Nussbaum, 1979 : 14	D-41
Xenopodinae	*	Metcalf, 1923 · 3	D-26

* *ASW* provides neither author nor date for this spelling
° name mentioned in *ASW*, but as an invalid name

1931). Therefore, if the checklist is to give this kind of information, it should give it correctly.

Finally, some even smaller errors must be mentioned, bearing on the first page of publication of new names or spellings, even when the reference to the work where these names or spellings appear is correct (see Table V). It is striking to note that even in these smaller details the EO rate is high (35.7 %), since out of 70 first pages cited, 25 are wrong. A funny example in this respect is the case of the name Leptodactylidae Werner, 1896, which is credited with the page 15 in *ASW* : this is the number of the page of the renumbered reprint of the paper (which starts on p. 1), but not the real number in the periodical where the paper was published. To save space, this type of small mistakes won't be mentioned again below for generic and specific names, where they also occur and at a similar rate.

A few additional comments · the first spelling given the name Brevicipitinae by BONAPARTE (1850) was Brevicipitina, not Brevicipina, as stated in *ASW* (pp. 355, 677) ; the first spelling given the name Pelobatidae by BONAPARTE (1850) was Pelobatidae, not Pelobatina, as stated in *ASW* (p. 409).

In the genus-group

The number of genus-group and species-group names mentioned in *ASW* is much too high to allow for a rapid quantitative survey of the type presented above for class-group and family-group names. I shall limit myself here to a few examples which struck me while reading the book. These examples are somewhat biased in that they mostly belong to the Asian and European groups of Amphibia with which I am personally best acquainted, but there is no reason to believe that they are not representative of the whole class.

An example which supports the latter assumption is a trivial but illustrative one : it concerns the references to the first pages of publication of the generic names of Amphi-

Table V. — Correct first page of appearance of new names or new spellings of names of the family-group mentioned in *ASW*, for which the bibliographic reference given is correct but not the page.

Name or spelling mentioned in *ASW* with its author and date	First page of publication given in *ASW*	Correct information	
		Real first page of publication	References
Ceratophrydes Tschudi, 1838	44	26	D-26
Cophylidae Cope, 1889	390	248	D-26
Cophylinae : Parker, 1934	10	v	D-26
Dendrobatidae Cope, 1865	103	100	D-26
Dicamptodontinae Tihen, 1958	21	1	D-41
Dyscophidae Boulenger, 1882 a	179	x	D-41
Genyophryninae Boulenger, 1890	326	327	D-26
Hemiphractinae : Gadow, 1901	210	139	D-26
Hyperoliidae Laurent, 1951	119	116	D-26
Ichthyophiidae Taylor, 1968	46	x	D-41
Leptodactylidae Werner, 1896	15	357	D-26
Leptopelinae Laurent, 1972	198	201	D-26
Microhylidae Parker, 1934	9	1	D-26
Microhylinae Noble, 1931	537	451	D-26
Myobatrachidae Schlegel, 1850	9	10	D-26
Myobatrachinae · Parker, 1940	6	2	D-26
Philautinae Dubois, 1981	258	227	D-26
Piprina Gray, 1825	213	214	D-26
Plethodontidae Gray, 1850	31	5	D-41
Rhinatrematidae Nussbaum, 1977	3	1	D-41
Rhyacotritoninae Tihen, 1958	25	1	D-41
Sooglossinae Noble, 1931	494	492	D-26
Telmatobii Fitzinger, 1843	43	32	D-26
Telmatobiinae : Vellard, 1951	21	3	D-26
Typhlonectidae Taylor, 1968	231	xi	D-41

bia created by TSCHUDI (1838). After the introduction, TSCHUDI's work is divided into two parts : in the first part (pp. 27-69), the various genera recognized by this author are diagnosed and discussed ; in the second part (pp. 70-98), the same genera are listed again, with their specific contents, the synonymies of the specific names and the distributions of the species. The new generic names created by TSCHUDI (1838) are nomenclaturally valid from the first part of this text, since they are associated there to diagnoses. Thus, if a checklist is to give the precise pages of publications of names (which, of course, is not absolutely necessary), the pages cited should be those of the first part of this work. The *ASW* checklist mentions 24 generic names of TSCHUDI (1838) : for 12 (50.0 %) of these names (*Boophis*, *Buergeria*, *Crinia*, *Hemidactylium*, *Litoria*, *Onychodactylus*, *Pleurodema*, *Polypedates*, *Pseudotriton*, *Pyxicephalus*, *Strongylopus*, *Theloderma*), the correct page, in the first part of the work, is given ; for 2 (8.3 %) of these names (*Cycloramphus*, *Leptobrachium*), the *ASW* list correctly mentions the page of the second part of the work (this

is the correct page there because both these generic names appear with different spellings in the two parts of the work, and the "correct original spellings" fixed later by first revisor actions are those of the second part) ; for 9 (37.5 %) of these names (*Ambystoma*, *Asterophrys*, *Cynops*, *Kalophrynus*, *Microhyla*, *Plethodon*, *Pseudobufo*, *Sphaenorhynchus*, *Trachycephalus*), the page of the second part of the work is incorrectly given as the first page of appearance of the name ; finally, for 1 (4.2 %) name (*Hynobius*), the page 56 (in the first part) is cited, but the correct page is 60. Thus, for this small information, the EO rate is 41.7 %. One cannot help from thinking that, if such small mistakes may in some cases be made by the various contributors of the book, it would have been the work of the editor and/or the editorial committee to check for homogeneity and precision of such type of information. If this was not done for well-known and important works like TSCHUDI's one, it is even less likely to have been done for smaller, less important ones. It is therefore likely that *ASW* is filled up with similar such small mistakes or omissions, which however cannot be discovered collectively but must be traced individually : in other words, in any given case, it seems reasonable not to directly use the information given in *ASW*, but rather to go back to the original publications for checking. The following examples taken at random in the book will further illustrate this assertion.

BUFONIDAE. — The generic name *Pedostibes* must be credited to Günther, 1876, not 1875 (see DUNCAN, 1937).

DENDROBATIDAE — The authors of the generic name *Phyllobates* are DUMÉRIL & BIBRON (1841), not BIBRON in SAGRA (1843), the latter work having appeared later (see SMITH & GRANT, 1958).

DISCOGLOSSIDAE — *Baleaphryne* is not a valid genus name : it is at least a subgenus (see HEMMER & ALCOVER, 1984) and more probably a simple synonym of *Alytes* (see DUBOIS, D-26) This latter generic name was created by WAGLER in 1829, not 1830 (see D-26)

HYLIDAE — The name *Hemiphractus* was created by WAGLER (1828 a) in a first paper which appears a few pages before that (1828 b) cited in *ASW*.

HYPEROLIIDAE — DUBOIS (D-11) recently noted that the name *Eremiophilus* Fitzinger, 1843 had priority over *Kassina* Girard, 1853, and discussed the problems raised by the conservation of this latter name. This question was the matter of an application by DUBOIS et al. (1983) and of a recent Opinion of the ICZN (ANONYMOUS, 1985 b). — The generic name *Megalixalus* must be credited to Günther, 1869, not 1868 (see DUNCAN, 1937).

LEPTODACTYLIDAE. — The author of the names *Adenomera* and *A marmorata* is STEINDACHNER (1867), not FITZINGER in STEINDACHNER (1867). — The choice of the name *Alsodes* rather than *Hammatodactylus* as the valid name of the genus containing both species *Cystignathus nodosus* and *Alsodes monticola* implies that the authors of *ASW* possess some evidence that BELL's (1843) paper was published earlier than FITZINGER's (1843) book. I do not know of such an evidence, and would have been interested to know if it exists If not, both names must be considered published on 31 December 1843 (see SMITH & GRANT, 1958), and the choice between them must be the matter of a first revisor action, but here again we would like to have a reference. LYNCH (1971 :124) mentioned the problem, but did not solve it, because he only supposed that FITZINGER's (1843) work *might* antedate BELL's (1843), and indicated that if it was true *Hammatodactylus* would have the priority.

MICROHYLIDAE. — DUBOIS (D-26 · 20-21, D-40) showed that, following the designation by DUMÉRIL & BIBRON (1841 : 740) of *Rana ovalis* Schneider, 1799 as type species of the nominal genus *Engystoma* Fitzinger, 1826, this latter name has priority over *Elachistocleis* Parker, 1927. He asked the ICZN to suppress DUMÉRIL & BIBRON's (1841) designation and to designate *Rana gibbosa* Linnaeus, 1758 as type species of *Engystoma*, following the incorrect actions of FITZINGER

(1843) (under *Systoma*) and STEJNEGER (1910). Although this application was sent to the ICZN on 15 October 1982, it has still not yet been published in the *Bulletin of Zoological Nomenclature*, and much less voted upon. — The generic name *Glyphoglossus* must be credited to Günther, 1869, not 1868 (see DUNCAN, 1937).

PELOBATIDAE. — It is stated in *ASW* that the name *Carpophrys* is a nomen nudum because it is unsupported by a diagnosis. This is simply not true : this name was clearly associated with a diagnosis (although in the form of a dichotomic key) in the original publication (ANONYMOUS, 1977). The reasons that make this name nomenclaturally unavailable are different (see D-10) the name was published anonymously, and without designation of a type species. Under the provisions of the current *Code*, a new generic name, to be available, after 1950 must not have been published anonymously (Art. 14), and after 1930 must be accompanied by the fixation of a type species (Art. 13b). None of these conditions were met with in the original publication (ANONYMOUS, 1977), but, quite funnily, they are now met with in *ASW*, since the checklist and its sections are not anonymous (the section on Megophryinae was contributed by Masafumi MATSUI), and since the following statement appears in *ASW* : "*Leptolalax oshanensis* was placed in the monotypic genus *Carpophrys*...". By doing so, *ASW* makes the generic name *Carpophrys* "almost" nomenclaturally available : it now has an author (MATSUI in FROST, 1985), a type species (*Megophrys oshanensis* Liu, 1950), and an "indication" (reference to the diagnosis given in ANONYMOUS, 1977) ; fortunately, this name is published in *ASW* as a junior synonym and for this reason cannot be made available (Art. 11 (e) (ii) of the *Code*).— The generic name *Leptobrachella* was created by SMITH (1925), not SMITH (1931) (see D-8).

RANIDAE. - The author of the mantelline generic name *Trachymantis* is METHUEN (1920), not "METHUEN & HEWITT (1920)" (see D-7).

RHACOPHORIDAE. - The name *Chiromantis* was created by PETERS in 1854, not 1855 (see D-11).

Altogether, and apart from the problems surrounding TSCHUDI's names, 15 errors or omissions were mentioned above, for 395 generic names listed in the book, but this analysis is not at all exhaustive and other mistakes certainly exist : the EO rate for this item is thus *at least* 3.8%, certainly much higher.

Besides the 395 generic names considered valid in *ASW*, this list mentions 11 subgeneric names considered valid, but gives the author and date for only one of them (*Echinotriton*).Authors and dates of the other ones are given here in Table VI. The EO rate for this information is thus 90.9 %.

Before leaving this chapter let us mention an important information which was published only after June 1984 and could therefore not be included in *ASW* but should appear in the next edition of the book. All authors until now have incorrectly considered *Salamandra genei* to be the type species of the genus *Hydromantes* Gistel, 1848. As shown elsewhere in detail (D-24), this is incorrect, and the name *Hydromantes* is a synonym of *Triturus*. Fortunately, this name can be replaced without problem by the very similar name *Hydromantoides* Lanza & Vanni, 1981, which causes virtually no nomenclatural disturbance (see D-24 for additional comments).

In the species-group

As for the genus-group names, I shall limit myself here to a few examples, and the following list of mistakes is certainly very incomplete. For simple reasons of time economy, it was mainly based on my personal knowledge of certain taxinomic groups or geographical regions. A simple extrapolation from these groups to other ones may not

Table VI. — Authors, dates, and type species of the subgenera considered valid in *ASW* but for which this information is not given there.

Genus	Subgenus	Author and date	Type species and its mode of designation	References
Ceratophrys	*Stombus*	Gravenhorst, 1825	*Rana cornuta* Linnaeus, 1758, by subsequent designation of GRAVENHORST, 1829	D-26
Megophrys	*Ophryophryne*	Boulenger, 1903	*Ophryophryne microstoma* Boulenger, 1903, by monotypy	D-8
Ptychadena	*Parkerana*	Dubois, 1984	Nomen novum for *Abrana* Parker, 1931 ; type species is therefore *Abrana cotti* Parker, 1931, by monotypy	D-11, D-22
Rana	*Babina*	Van Denburgh, 1912	*Rana holsti* Boulenger, 1892, by original designation	D-11
	Euphlyctis	Fitzinger, 1843	*Rana leschenaultii* Duméril & Bibron, 1841, by original designation	D-11
	Hylarana	Tschudi, 1838	*Hyla erythraea* Schlegel, 1837, by monotypy	D-11
	Limnonectes	Fitzinger, 1843	*Rana kuhlii* Duméril & Bibron, 1841, by original designation	D-11
	Paa	Dubois, 1975	*Rana liebigii* Günther, 1860, by original designation	D-11
Scaphiopus	*Spea*	Cope, 1866	*Scaphiopus bombifrons* Cope, 1863, by original designation	D-41
Scutiger	*Oreolalax*	Myers & Leviton, 1962	*Scutiger pingii* Liu, 1943, by original designation	D-8

be warranted, since different groups were clearly submitted to different treatments, but at least this biased sample shows that the book is still rich in mistakes.

BUFONIDAE. — If the name *Bufo arabicus* is to be considered a synonym of the name *Bufo orientalis*, it should replace it as the valid name of the species. — If the name *Bufo sulphureus* is a synonym of *Bufo koynayensis*, it should not be cited as a valid name. — The specific name *Hylaplesia borbonica* which appears in SCHLEGEL (1827) is a nomen nudum ; this name became nomenclaturally available only with the publication by TSCHUDI (1838) of a diagnosis of this species (see D-15). — The nominal species *Bufo glaberrimus* should be credited to Günther, 1869, not 1868, and the nominal species *Ansonia ornata, Bufo beddomii, Bufo hololius* and *Pedostibes tuberculosus* to Günther, 1876, not 1875 (see DUNCAN, 1937).

DENDROBATIDAE. — The original name of the type species of *Dendrobates* is *Rana tinctoria* Cuvier, 1797, not *Calamita tinctorius* Schneider, 1799. — The specific name *Phyllobates bicolor* must be credited to Duméril & Bibron, 1841, not Bibron in SAGRA 1843 (see SMITH & GRANT, 1958).

DISCOGLOSSIDAE. — The correct name of the type species of *Barbourula* is *busuangensis*, not *busangensis*.

HYLIDAE. — The authors of the name *Hyla albovittata* (and of other names published in the same work) are LICHTENSTEIN, WEINLAND & VON MARTENS (1856), not LICHTENSTEIN & MARTENS (1856) (see D-26). — The correct reference to the name *Hyla cinerea* is Schneider, 1799, not 1792, and that to the name *Hyla leucotaenia* is Günther, 1869, not 1868 (see DUNCAN, 1937). — BOUR & DUBOIS (1984) recently gave a discussion about the nomenclatural availability of the name *Rana bicolor* Boddaert, 1772.

HYPEROLIIDAE. — The nominal species *Hylambates viridis* should be credited to Günther, 1869, not 1868 (see DUNCAN, 1937).

LEPTODACTYLIDAE. — Although FITZINGER (1843) cited "*Hylod. lineatus.* Dum. Bibr." as type species of his new genus *Lithodytes*, the valid name of this species is *Rana lineata* Schneider, 1799, a name mentioned by DUMÉRIL & BIBRON (1841) in the synonymy of their *Hylodes lineatus*.

There exists therefore no nominal species *"Hylodes lineatus* Duméril and Bibron, 1841". This is fortunate, because otherwise the name *Eleutherodactylus lineatus* (Brocchi, 1879) would be a primary homonym and would have to be replaced. — The correct name of the type species of *Cycloramphus* is *C. fulginosus,* not *C. fuliginosus.* — The original reference to the name *Ceratophrys boiei* is WIED-NEUWIED (1824 : 673), not WIED-NEUWIED (1825 : 592) (see D-26). — The emendation of the specific name *Eleutherodactylus gaigei* (Dunn, 1931) into *gaigeae* used in *ASW* is unjustified. As a matter of fact, Art. 31 (a) (i) of the *Code* reads as follows : "A species-group name, if a noun in the genitive case formed (...) from a modern personal name that is or has been latinized, is to be formed in accordance with the rules of Latin grammar". The spelling *gaigei,* dedicated to Helen T. GAIGE, must be considered as the genitive of the name *gaigeus.* It is true that most Latin names of the second declension are of masculine gender, but some are feminine, in particular names of trees (like *fagus),* countries (like *Aegyptus)* or cities (like *Corinthus)* — just like some names of the first declension are of masculine gender. Therefore, names like *Eleutherodactylus gaigei* or similarly *Leptobrachium boringii* (dedicated to Alice M BORING, but not emended in *ASW*), are correct and should not be emended. — The nominal species *Cystignathus rhodonotus* should be credited to Günther, 1869, not 1868 (see DUNCAN, 1937).

MICROHYLIDAE. — The original name of the type species, by monotypy, of the genus *Ramanella,* was *R. simbiotica,* not *symbioitica* "(in error for *symbiotica)* "! The author of the unjustified emendation *symbioitica* is PARKER (1934 : 90). — The author of the name *Engystoma marmoratum,* type species by monotypy of *Uperodon* Duméril & Bibron 1841, is GUÉRIN-MÉNEVILLE (1838), not CUVIER (1829) (see D-26 : 23). — The nominal species *Glyphoglossus molossus* should be credited to Günther, 1869, not 1868, and the nominal species *Callula triangularis* to Günther, 1876, not 1875 (see DUNCAN, 1937).

PELOBATIDAE. — The correct spelling of the name of the species called *Leptobrachium pullus* in *ASW* is *L. pullum.* — The author of the specific name *Megophrys monticola,* synonymous of *Megophrys montana* Kulh & Van Hasselt, 1822 a, is SMITH (1931), not KUHL & VAN HASSELT (1822 b), for the reasons explained elsewhere (D-17). — The specific name *Megophrys pachyproctus* is based on the Greek name *proctos* (vent), of masculine gender, and should not be emended into *pachyprocta.* — I showed elsewhere (D-17) that the valid name of the species currently known as *Megophrys parva* (Boulenger, 1893) is in fact *Megophrys monticola* (Günther, 1864). To avoid nomenclatural disturbance, I addressed on 27 May 1981 an application to the ICZN (D-37), which has yet not been plublished.

PIPIDAE — If the synonymy of *Xenopus wittei* includes *Xenopus (laevis) bunyoniensis,* this latter name has priority and the species should be known as *Xenopus bunyoniensis.*

RANIDAE. — BROWN (in *ASW* : 459) suggests to use the name *Discodeles ventricosus* for the species described as *Rana ventricosus* by VOGT (1912). However, according to the *Code* (Art. 52), "a junior primary homonym is permanently invalid", and this name is preoccupied by *Rana ventricosa* Linnaeus, 1758. The valid name of this species is therefore *Discodeles vogti* (Hediger, 1934) (not Heidiger, as printed in *ASW*). — The following original names are omitted in *ASW* : *Rana (Paa) arnoldi, Rana (Chaparana) fansipani, Rana (Paa) hazarensis, Rana (Euphlyctis) keralensis, Rana (Paa) minica* and *Rana (Strongylopus) bonaespei.* This latter name (see D-9) is mispelled *bonaspei* in *ASW* (p. 522). — The author of the name *Rana dalmatina* is Fitzinger in BONAPARTE, 1838, not Bonaparte, 1840 (see D-27). — The valid name of the species called *Rana dauchina* in *ASW* (p. 488) is *R. daunchina.* — The author of the name *Rana limnocharis* is not "Boie in WIEGMANN (1835)", but Gravenhorst, 1829 (see D-28). This case is exactly similar to that of the name *Polypedates leucomystax,* correctly analyzed by HOOGMOED in *ASW* (p. 541), and should be treated in the same way. — The name *Rana mortenseni* was synonymized with *Rana nigrovittata* by SMITH (1922), and I am not aware that it has been resurrected since — The names *Rana quadranus* and *Rana unculuanus* are based on the Latin word "anus" (vent), and must therefore be treated as invariable names standing in apposition to the generic name *Rana* : the emendations *quadrana* and *unculuana*

which appear in *ASW* are thus totally unjustified and unacceptable ! — There exists no such name as *"Rana pullus* Stoliczka, 1870", but a name *Rana gracilis* var. *pulla* Stoliczka, 1870 (see D-28 : 155). — The nominal species *Ixalus opisthorhodus* should be credited to Günther, 1869, not 1868, and the nominal species *Ixalus diplostictus, Polypedates beddomii, Polypedates brachytarsus, Polypedates formosus, Rana pygmaea* and *Rana verrucosa* to Günther, 1876, not 1875 (see DUNCAN, 1937).

RHACOPHORIDAE. — As mentioned in *ASW,* the name *Rhacophorus moschatus* Kuhl & Van Hasselt, 1822 has priority over the name *Hyla reinwardtii* Schlegel, 1840. To solve this problem, I addressed on 27 May 1981 to the ICZN an application (D-38) which has not yet been published. — The nominal species *Ixalus nasutus, Polypedates cavirostris, Polypedates nasutus* and *Polypedates rufescens* should be credited to Günther, 1869, not 1868, and the nominal species *Ixalus beddomii, Ixalus chalazodes* and *Polypedates jerdonii* to Günther, 1876, not 1875 (see DUNCAN, 1937).

The above mistakes are only examples and certainly much below the total number of mistakes for this type of information, which could be known precisely only by a detailed checking of the 4015 nominal species' names, authors, dates and references. They bear on 60 names, and thus indicate a certainly much underestimated EO rate of at least 1.5 %.

TYPE SPECIES OF GENERA AND SUBGENERA

In the *ASW* checklist, 406 genus-group names are cited as valid (395 for genera, 11 for non-nominative subgenera). The type species are given for all genera, and for 1 of the subgenera ; the omission rate for this information on the 406 names is therefore 2.5 %. Table VI gives the lacking information for the 10 subgeneric names.

Among the 396 genus-group names for which the list provides the name of the type species, this information is incorrect for at least 10 of them (at least, because I did not systematically check the validity of the information for all names, but only noticed some mistakes while looking through the book). Table VII gives the correct information in these cases. The error rate for this information on the 406 names is therefore of at least 2.5 %, and the total EO rate for this information is at least 4.9 %.

As far as the *mode* of designation of the type species of genera is concerned, this information is given for only 297 of the 395 genera listed in the book (omission rate 24.8 %). As shown in Table VIII, a detailed analysis shows that the quality of the information in this respect greatly depends on the group studied, and hence on the contributors which were in charge of the various groups (apparently the editor and the checklist committee did not improve contributors' works in this respect). Thus the information in this field is null for 5 families (Discoglossidae, Heleophrynidae, Leiopelmatidae, Pelodytidae, Pseudidae), it is between 25 and 90 % for 12 families, between 90 and 100 % for 5 families, and it is 100 % for 15 families. The information is more complete in the Urodela (95.1 %) than in the Gymnophiona (85.3 %) or Anura (70.0 %).

However, even among the 297 genera for which this information is given, many mistakes remain. Table IX gives a list of the genera for which I noted that the mode of designation given in *ASW* was incorrect : they are at least 26 in number (again, this is a lower estimate, since I did not check the validity of this information for all genera, far from this). The error rate for this information is at least 8.8 % of the 297 names, or 6.6 % of the 395 genera listed in the book. The total EO rate for the mode of designation of type species of genera is thus at least 124 out of 395, i.e. at least 31.4 %.

Table VII. — Correct information concerning the type species of some genera for which *ASW* provides incorrect information.

Genus	Type species and its mode of designation as given in *ASW*	Correct information	
		Type species and its mode of designation	Ref.
Afrixalus Laurent, 1944	*Megalixalus fornasinii congicus* Laurent, 1941	*Euchnemis fornasinii* Bianconi, 1849, by original designation (LAURENT, 1944 : 111)	D-11
Dendrobates Wagler, 1830	*Calamita tinctorius* Schneider, 1799, by subsequent designation of DUMÉRIL & BIBRON, 1841	Nomen novum for *Hylaplesia* Boie in SCHLEGEL, 1827, which is an unjustified emendation of *Hysaplesia* Boie in SCHLEGEL, 1826 ; type species is *Rana tinctoria* Cuvier, 1797, by subsequent designation of DUMÉRIL & BIBRON, 1841	D-18, D-21, D-26
Ichthyophis Fitzinger, 1826	*Ichthyophis hasselti* Fitzinger, 1826 (nomen nudum) (= *Caecilia hypocyanea* Boie, 1827)	*Caecilia glutinosa* Linnaeus, 1758, by monotypy	D-41
Leptodactylus Fitzinger, 1826	*Rana fusca* Schneider, 1799	*Rana typhonia* Latreille in SONNINI & LATREILLE, 1801 (non *Rana typhonia* Linnaeus, 1758), by subsequent designation of FITZINGER, 1843	D-26
Lithodytes Fitzinger, 1843	*Hylodes lineatus* Duméril & Bibron, 1841	*Rana lineata* Schneider, 1799, by original designation	D-41
Mertensiella Wolterstorff, 1925	Not designated	Nomen novum for *Exaeretus* Waga, 1876 ; type species is therefore *Exaeretus caucasicus* Waga, 1876, by monotypy	D-41
Necturus Rafinesque, 1819	*Necturus lateralis* Wagler, 1830 (= *Sirena maculosa* Rafinesque, 1818), by subsequent designation of FITZINGER, 1843	*Sirena maculosa* Rafinesque, 1818, by subsequent designation of BROWN, 1908	D-41
Pseudophryne Fitzinger, 1843	*Pseudophryne australis* Duméril & Bibron, 1841, by original designation	*Bombinator australis* Gray, 1835, by original designation	D-41
Rhinatrema Duméril & Bibron, 1841	*Caecilia bivittata* Cuvier, 1829 (nomen nudum) (= *Caecilia bivittatum* Guérin-Méneville, 1829)	*Caecilia bivittata* Guérin-Méneville, 1838, by monotypy	D-41
Strongylopus Tschudi, 1838	*Rana fasciata* Tschudi, 1838	No type species at present ; case submitted on 8 September 1980 by DUBOIS to the ICZN in an application which has still not been published	D-11, D-36

Since the various families and genera have been entrusted to different contributors, a certain heterogeneity was inescapable in their treatment. Homogeneization of these different contributions, which could have been done by the editors, is clearly wanting. As in the case of TSCHUDI's names discussed above, an instructive example in this respect is given by the genus-group names created by FITZINGER (1843) and considered valid in *ASW*, which are 16 in number. As remarked by DUBOIS (D-15), all these names are perfectly valid according to the *Code*, being associated with clear type species designations (in a column bearing the title "Typus"). For 3 (18.8 %) of these names (*Limnodynastes*, *Pseudophryne*, *Tachycnemis*), the designation of the type species is correctly stated in *ASW* to be "by original designation" ; for 4 (25.0 %) other names (*Gastrophryne*, *Gastrotheca*, *Ololygon*, *Pseudacris*), this designation is erroneously stated to be "by monotypy" ; for 1 (6.3 %) name (*Phrynohyas*), it is erroneously stated to be "by monotypy

Table VIII. — Quantitative analysis of the information given in *ASW* on the mode of designation of the type species of the genera considered valid in *ASW*. The mode of designation stated in *ASW* is sometimes in error : see text and Tables VII and IX.

Order, family	Number of genera considered valid in *ASW*	Mode of designation of the type species stated in *ASW*	
		N	%
Anura	300	210	70.0
Arthroleptidae	8	8	100
Brachycephalidae	2	1	50.0
Bufonidae	25	20	80.0
Centrolenidae	2	1	50.0
Dendrobatidae	4	3	75.0
Discoglossidae	5	0	0
Heleophrynidae	1	0	0
Hemisidae	1	1	100
Hylidae	37	23	62.2
Hyperoliidae	14	13	92.9
Leiopelmatidae	2	0	0
Leptodactylidae	51	22	43.1
Microhylidae	59	41	69.5
Myobatrachidae	20	20	100
Pelobatidae	9	4	44.4
Pelodytidae	1	0	0
Pipidae	4	1	25.0
Pseudidae	2	0	0
Ranidae	39	38	97.4
Rhacophoridae	10	10	100
Rhinodermatidae	1	1	100
Rhinophrynidae	1	1	100
Sooglossidae	2	2	100
Urodela	61	58	95.1
Ambystomatidae	2	2	100
Amphiumidae	1	1	100
Cryptobranchidae	2	2	100
Dicamptodontidae	2	2	100
Hynobiidae	9	8	88.9
Plethodontidae	27	26	96.3
Proteidae	2	2	100
Salamandridae	14	13	92.9
Sirenidae	2	2	100
Gymnophiona	34	29	85.3
Caeciliidae	24	22	91.7
Epicriidae	3	1	33.3
Rhinatrematidae	2	1	50.0
Scolecomorphidae	1	1	100
Typhlonectidae	4	4	100
Total Amphibia	395	297	75.2

and subsequent designation" (!) ; and finally for 8 (50.0 %) other names (*Euphlyctis, Eupsophus, Leptophryne, Limnomedusa, Limnonectes, Lithodytes, Osteopilus, Peltophryne*), the mode of designation of the type species is not stated. The total EO rate for this information is therefore of 13 out of 16, i.e. 81.3 %.

Beside this, it should be noted that FITZINGER (1843) also designated type species for some genera created before him by other authors. Some of these designations are clearly acknowledged in *ASW* (e.g. for the genera *Plethodon, Polypedates, Rana*) while others are not. Thus, FITZINGER (1843: 31) clearly designated *Rana gryllus* LeConte, 1825 as type species of the genus *Acris* Duméril & Bibron, 1841, but, following DUELLMAN (1970), *ASW* writes that *Rana gryllus* is the type species of *Acris* "by fiat".

Some comments are necessary for some of the information which appears in Tables VII and IX.

A first comment concerns the type species of *Ichthyophis* Fitzinger, 1826. FITZINGER (1826 : 36) referred two nominal species to this new genus : *Caecilia glutinosa* Linnaeus, 1758, and "a new species from Java" which he called *Ichthyophis hasseltii* but for which he proposed no diagnosis. The name *Ichthyophis hasseltii* is therefore a nomen nudum in this work, and *Caecilia glutinosa*, the only available name associated with the generic name *Ichthyophis* in the original description, is the name of the type species of this genus by monotypy. A similar situation is met with for the genus *Pseudotriton* Tschudi, 1838, which was created for the nominal species *Salamandra subfusca* Green, 1818, and for a second species which is called *Triton major* on p. 60 and *Pseudotriton nigra* on p. 95 of TSCHUDI's (1838) work. Both these later names are nomina nuda in this work, and *S. subfusca* is therefore the type species of *Pseudotriton* by monotypy.

A different case is that of the type species of the genus *Pseudophryne* Fitzinger, 1843, which is stated in *ASW* to be : "*Phryniscus australis* Duméril and Bibron, 1841 [not of Gray, 1835] (= *Pseudophryne semimarmorata* Lucas, 1892, according to Parker, 1940, Novit. Zool., 42 : 101), by original designation". As a matter of fact, there exists no nominal species "*Phryniscus australis* Duméril and Bibron, 1841". DUMÉRIL & BIBRON (1841 : 725) clearly attributed this species name to GRAY (1835), and it is irrelevant in this respect that the specimens to which they applied this name were in fact members of a biological species distinct from that described by GRAY (1835) as *Bombinator australis* : any author who misidentifies specimens and applies in error an existing name to them does not create a new specific name, otherwise the taxinomic literature would be extremely overcongested (in this respect see D-24) ! Incidentally, the same applies to the problem of the type species of the genus *Synapturanus* Carvalho, 1954, and I personally disagree with the petition presented by LESCURE & NELSON (1977) concerning the type species of this genus.

Another problem is raised by the type species of the genus *Strongylopus* Tschudi, 1838. In a detailed paper (D-36) submitted for publication to the ICZN on 8 September 1980 but which has not yet been published, I presented evidence that this nominal genus does not at present have a type species, and that the possible designations of type species available under the Rules would result in nomenclatural problems. I therefore asked the Commission to use its Plenary Powers to designate for it a type species in agreement with current usage.

The type species of *Caudiverbera* Laurenti, 1768 cannot be "*Caudiverbera peruviana* Laurenti, 1768, by tautonymy" (*ASW* : 262) ! STEJNEGER (1936) considered *C. peruviana* as the type species of *Caudiverbera* because this species was "the same as *Lacerta caudiverbera* Linnaeus". Had this latter name been cited by LAURENTI (1768) among the included species of his genus *Caudiverbera*, it would actually become the type species

Table IX. — Correct information concerning the mode of designation of the type species of some genera for which *ASW* provides incorrect information.

Genus	Type species	Mode of designation as given in *ASW*	Correct information	
			Mode of designation	Ref.
Acris Duméril & Bibron, 1841	*Rana gryllus* LeConte, 1825	"By fiat"	Subsequent designation of FITZINGER, 1843	D-26
Ambystoma Tschudi, 1838	*Lacerta subviolacea* Barton, 1804	Subsequent designation of FITZINGER, 1843	Monotypy	D-41
Caudiverbera Laurenti, 1768	*Caudiverbera peruviana* Laurenti, 1768	Tautonymy	Subsequent designation of STEJNEGER, 1936	D-41
Chrysobatrachus Laurent, 1951	*Chrysobatrachus cupreonitens* Laurent, 1951	Original designation	Monotypy	D-11
Colostethus Cope, 1866	*Phyllobates latinasus* Cope, 1863	Monotypy	Original designation	D-26
Dyscophus Grandidier, 1872	*Dyscophus insularis* Grandidier, 1872	Original designation	Monotypy	D-26
Gastrophryne Fitzinger, 1843	*Engystoma rugosum* Duméril & Bibron, 1841	Monotypy	Original designation	D-26
Gastrotheca Fitzinger, 1843	*Hyla marsupiata* Duméril & Bibron, 1841	Monotypy	Original designation	D-26
Hemiphractus Wagler, 1828	*Hemiphractus spixii* Wagler, 1828	Subsequent designation of PETERS, 1862	Monotypy	D-26
Hymenochirus Boulenger, 1896	*Xenopus boettgeri* Tornier, 1896	Original designation and monotypy (!)	Monotypy	D-26
Kassinula Laurent, 1940	*Kassinula wittei* Laurent, 1940	Original designation	Monotypy	D-11
Laurentomantis Dubois, 1980	*Microphryne malagasia* Methuen & Hewitt, 1913	Monotypy	Monotypy under *Microphryne* Methuen & Hewitt, 1913	D-7
Nyctymystes Stejneger, 1916	*Nyctimantis papua* Boulenger, 1897	Original designation	Monotypy	D-26
Ololygon Fitzinger, 1843	*Hyla strigilata* Spix, 1824	Monotypy	Original designation	D-41
Osteocephalus Steindachner, 1862	*Osteocephalus taurinus* Steindachner, 1862	Original designation	Subsequent designation of KELLOGG, 1932	D-41
Phrynohyas Fitzinger, 1843	*Hyla zonata* Spix, 1824	Monotypy and subsequent designation of the ICZN, 1958, Opin. 520 (!)	Original designation	D-41
Phrynomerus Noble, 1926	*Brachymerus bifasciatus* Smith, 1849	Monotypy	Original designation	D-26
Proteus Laurenti, 1768	*Proteus anguinus* Laurenti, 1768	Monotypy (!)	Subsequent designation of STEJNEGER, 1936	D-41
Pseudacris Fitzinger, 1843	*Rana nigrita* LeConte, 1825	Monotypy	Original designation	D-41
Pseudohemisus Mocquard, 1895	*Hemisus obscurus* Grandidier, 1872	Original designation	Monotypy	D-26
Pseudotriton Tschudi, 1838	*Salamandra subfusca* Green, 1818	Subsequent designation of FITZINGER, 1843	Monotypy	D-41
Salamandra Laurenti, 1768	*Salamandra maculosa* Laurenti, 1768	Tautonymy	Subsequent designation of FITZINGER, 1843	D-41
Scaphiophryne Boulenger, 1882	*Scaphiophryne marmorata* Boulenger, 1882	Original designation	Monotypy	D-26
Somuncuria Lynch, 1978	*Telmatobius somuncurensis* Cei, 1969	Monotypy	Original designation	D-41

Tornierella Ahl, 1924	*Tornierella pulchra* Ahl, 1924	Monotypy	Original designation	D-11
Triturus Rafinesque, 1815	*Triton cristatus* Laurenti, 1768	Subsequent designation (implied) of DUNN, 1918	Subsequent designation of FITZINGER, 1843, under *Triton* Laurenti, 1768	D-41

by tautonymy of this genus, but, since it was not, it is not eligible for type fixation, and STEJNEGER's action results in a subsequent designation of type species for this genus. The same situation is encountered in the case of the generic name *Salamandra*. The specific name *Lacerta salamandra* Linnaeus, 1758 was not part of the originally included species of this genus and is not eligible for type fixation. The author of the subsequent designation in this case is FITZINGER (1843).

On the whole, for only three quarters of the generic names considered valid in the list, information is given on the mode of designation of the type species : one may suppose that in the remaining quarter of cases, the primary literature (original description, revision papers) has not been consulted by the authors of the list (if not, why has this information been omitted in these cases and given in the other ones ?). Furthermore, when one considers that, even when some information in this field is provided in the list, this information is incorrect in at least 8.8 % of the cases, it is clear that the primary literature has not been consulted in more than one quarter of the cases, perhaps as much as in half of the cases. If the same figures hold also for all other types of information given, especially at the specific level (where I have not made such a detailed analysis), the situation is quite unsatisfactory.

TYPE SPECIMENS OF SPECIES

The type specimens section is one of the poorest of all (see Table X). The book reports about 4015 nominal species. Of these, only 3216 (80.1 %) are acknowledged with the proper collection number(s) of their type(s) ; for 539 other species (13.4 %), only the Museum(s) where the types are deposited are listed, or, in the case of syntypes, only a part of them have been traced ; finally, for 260 names (6.5 %), the types either have not been traced, or are "supposed lost". Lectotypes and neotypes, which are of particular interest and more important than original types to list in such a book (since they are more difficult to trace, not being mentioned in the original publication), are not all listed. As mentioned above in the "General comments", even when information is given on type specimens, it may be wrong, in particular as concerns the types considered as "lost" in the list (details on this will be published elsewhere).

The quantity and quality of the information on type specimens is highly dependent on the Museum in which these types are deposited. It is clear that a particular effort of location of types has been done by some, but not all, of the contributors or reviewers of the checklist, working in some Museums, but this effort has been unequal. Table XI presents a quantitative analysis of the completeness of the information presented in *ASW* on type specimens (irrespective of the correctness of this information, which I did not check) in the 20 major collections of the world. The information, is stated to be complete (100 %) for only four of these Museums (Lawrence, Ann Arbor, Chengdu, São Paulo) ; it is between 90 and 100 % for 9 Museums, between 50 and 90 % for 5 Museums, and

Table X. — Quantitative analysis of the information given in *ASW* on the type specimens of the species considered valid in *ASW*. Signification of the categories used to describe the identification of the type specimens :

Complete : i.e. either all types identified and indicated by their Museum numbers, or types definitely indicated as lost or destroyed (this information may sometimes be in error ; see text).

Partial : i.e. Museum only definitely or tentatively identified, but no specimen numbers given, or partial list of syntypes, or types indicated as "probably lost", etc.

Absent : i.e. types indicated as "unknown", "not traced", "not located", "not known to exist", etc., or also "not stated" or "not designated" (which is misleading, because many of the type specimens for which *ASW* gives collection numbers were also not stated or designated in the original publications).

Order, family	Number of species listed as valid in *ASW*	Identification of the type specimens			
		Complete		Partial	Absent
		N	%	N	N
Anura	3495	2781	79.6	495	219
Arthroleptidae	73	44	60.3	29	0
Brachycephalidae	2	2	100	0	0
Bufonidae	339	266	78 5	51	22
Centrolenidae	64	64	100	0	0
Dendrobatidae	116	106	91.4	7	3
Discoglossidae	14	6	42.8	4	4
Heleophrynidae	4	2	50.0	2	0
Hemisidae	8	6	75.0	1	1
Hylidae	637	593	93.1	16	28
Hyperoliidae	219	138	63.0	68	13
Leiopelmatidae	4	3	75.0	1	0
Leptodactylidae	722	624	86.4	50	48
Microhylidae	281	234	83.3	31	16
Myobatrachidae	100	94	94.0	2	4
Pelobatidae	84	67	79.8	10	7
Pelodytidae	2	0	0	1	1
Pipidae	26	20	76.9	1	5
Pseudidae	4	4	100	0	0
Ranidae	603	387	64.2	168	48
Rhacophoridae	187	115	61.5	53	19
Rhinodermatidae	2	2	100	0	0
Rhinophrynidae	1	1	100	0	0
Sooglossidae	3	3	100	0	0
Urodela	357	287	80.4	32	38
Ambystomatidae	31	20	64.5	7	4
Amphiumidae	3	2	66 7	0	1
Cryptobranchidae	3	2	66.7	1	0
Dicamptodontidae	4	3	75.0	0	1
Hynobiidae	33	25	75.8	4	4
Plethodontidae	221	200	90.5	11	10

Proteidae	6	4	66.7	0	2
Salamandridae	53	31	58.5	9	13
Sirenidae	3	0	0	0	3
Gymnophiona	163	148	90.8	12	3
Ceciliidae	88	81	92.0	4	3
Epicriidae	40	36	90.0	4	0
Rhinatrematidae	9	8	88.9	1	0
Scolecomorphidae	7	7	100	0	0
Typhlonectidae	19	16	84.2	3	0
Total Amphibia	4015	3216	80.1	539	260

less than 50 % for 2 Museums. For all other collections altogether, it is a little less than 80 %, and for all Museums altogether a little more than 80 %. The completeness of the information is a bit higher on the whole for the Museums or Universities in which work members of the Checklist Committee under the auspices of which the *ASW* list was compiled : Lawrence (100 %), San Francisco (96.3 % ; not among those listed in Table XI), Ann Arbor (100 %), London (73.6 %) and Leiden (96.8 %) — thus 93.3 % on average. Some major Museums like Paris or Berlin Museums were clearly not contacted for a verification of the correctness or a completion of the information on type specimens given in *ASW*. Among the 255 type specimens (or type series) listed as being deposited in the Paris Museum, only 229 (89.8 %) are definitely identified with their collection numbers. However, among those, I found at least 22 (9.6 %) wrong sets of information (wrong numbers, incomplete series of syntypes, lectotypes not mentioned as such, etc.) (more details on this question will be given in my forthcoming catalogue of the type specimens of anurans in the Paris Museum collection). Thus the total EO rate for the information concerning type specimens in the Paris Museum is at least 18.8 %.

The authors of *ASW* do not seem to be aware of Art. 74 (b) of the *Code*, which states that any author who has published the inference that a specimen, which was part of the original syntypes of a nominal species, is the "holotype" or the "type", is deemed to have validly designated a lectotype. This "designation of lectotype by inference of holotype" is not that rare, and should be carefully traced in a checklist which has the ambition to list all type specimens of a group. Among all the specimens which are listed as "holotypes" in *ASW*, at least those of the following species (and certainly others) are in fact lectotypes designated "by inference of holotype" : *Hyla boans*, *Hyla chinensis*, *Limnodynastes peronii*, *Rana delacouri*, *Rana fuscigula*, *Rana kuhlii*, *Rana moluccana* and *Rana sanguinea*.

Among the lectotypes and neotypes which are not mentioned in *ASW*, are at least the lectotype of *Laurentomantis ventrimaculata* (D-7) and the neotype of *Nyctixalus margaritifer* (D-11).

OTHER TYPES OF INFORMATION

For all other types of information (type localities, distributions, comments, bibliographic references), I did not attempt an exhaustive analysis, but only picked up various types of errors and omissions, in the groups which I know better, during a rapid survey of the book.

Table XI. — Quantitative analysis of the information given on the type specimens listed in *ASW*, according to their Museum of deposition.
This information is given for the 20 largest collections of Amphibians in the world (more than 40 types or type series mentioned in *ASW*). The information is considered complete when the collection numbers are given in full in *ASW* and when the status of type is considered definite, not doubtful, in *ASW* (this information may sometimes be in error ; see text).
N : number of species for which *ASW* indicates the presence, at least doubtful, of a type specimen or a type series in this Museum.
C : number of species for which the information on these type specimens is complete.
% : ratio of C to N.

Museum	Anura			Urodela			Gymnophiona			Amphibia		
	N	C	%	N	C	%	N	C	%	N	C	%
London	659	472	71.6	24	22	91.7	34	34	100	717	528	73.6
Washington	193	188	97.4	73	69	94.5	12	10	83.3	278	267	96.0
Paris	225	205	91.1	19	14	73.7	11	10	90.9	255	229	89.8
Harvard	221	216	97.7	12	12	100	14	14	100	247	242	98.0
Lawrence	181	181	100	12	12	100	4	4	100	197	197	100
Berlin	179	87	48.6	5	4	80.0	10	5	50.0	194	96	49.5
New York	133	128	96.2	10	10	100	13	12	92.3	156	150	96.2
Chicago	99	90	90.9	46	45	97.8	10	9	90.0	155	144	92.9
Ann Arbor	78	78	100	16	16	100	4	4	100	98	98	100
Philadelphia	54	43	79.6	18	14	77.8	2	2	100	74	59	79.7
Wien	57	54	94.7	7	7	100	7	7	100	71	68	95.8
Tervuren	71	35	49.3	0	0	-	0	0	-	71	35	49.3
Frankfurt-am-Main	66	62	93.9	1	0	0	2	2	100	69	64	92.8
Chengdu	59	59	100	7	7	100	0	0	-	66	66	100
São Paulo*	66	64	97.0	0	0	-	0	0	-	66	64	97.0
Leiden	52	50	96.2	6	6	100	5	5	100	63	61	96.8
Genova	56	44	78.6	0	0	-	1	1	100	57	45	78.9
Genève	47	45	95.7	0	0	-	0	0	-	47	45	95.7
Rio de Janeiro	43	35	81.4	0	0	-	1	1	100	44	36	81.8
São Paulo**	41	41	100	0	0	-	1	1	100	42	42	100
Other collections	848	663	78.2	84	71	84.5	36	28	77.8	968	762	78.7
Total	3428	2840	82.8	340	309	90.9	167	149	89.2	3935	3298	83.8

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BUFONIDAE. — On the basis of various works, DUBOIS (D-19, D-26, D-29) tentatively recognized 5 subfamilies in this family, which is not even mentioned in *ASW*. — ***Bufo himalayanus*** is also present in the western part of Himalayas (DUBOIS & MARTENS, 1977 ; DUBOIS, D-6, D-13). — The name ***Bufo bufo formosus***, often cited in the literature, should be mentioned as a synonym or subspecies of ***Bufo japonicus*** (see MATSUI, 1984). — The validity of the placement of the species

Bufo kelaartii in the genus *Bufo* has been questioned (see INGER, 1972 ; DUBOIS, D-26). — DUBOIS (D-1) gave an extensive discussion of the systematics of the species *Bufo stomaticus* and of related forms. — The current status of the name *rondoensis*, type species of the genus *Mertensophryne*, should be given. — The recent work by WAKE (1980) should be cited in the comments of *Nectophrynoides*.

DENDROBATIDAE — The history of this family-group name is incomplete, not mentioning the name Eubaphidae Bonaparte, 1850 and the possible use of Art. 40 in particular (see D-18). Besides, as shown in detail elsewhere (D-18, D-21), the generic name *Dendrobates* Wagler, 1830 is a substitute name for *Hylaplesia* Boie in Schlegel, 1827, which is itself an unjustified emendation of *Hysaplesia* Boie in Schlegel, 1826.

HYLIDAE — DUBOIS (D-14, D-23) suggested to consider *Pseudacris* as a subgenus of *Hyla*, and consequently proposed the replacement name *Hyla (Pseudacris) nigrita floridensis* for the subspecies previously known as *Pseudacris nigrita verrucosa*.

LEPTODACTYLIDAE — In *ASW*, the species *Physalaemus nattereri* is placed in the *P. biligonigerus* group, but *P. biligonigerus* is placed in the *P. cuvieri* group ! — The nominal species *Batrachophrynus patagonicus* could not have been transferred to *Atelognathus* previous to the description of this genus, of which furthermore it is the type species !

MICROHYLIDAE. — The distributions of *Kaloula pulchra*, *Microhyla ornata* and *Uperodon globulosus* include Nepal (D-1, D-3, D-6, D-13)

MYOBATRACHIDAE — Since the original names of the species *Crinia bilingua*, *C. deserticola*, *C. remota* and *C. signifera* contained the genus-group name *Ranidella*, it is clear that these species were "formerly in *Ranidella*" (*ASW* : 402) !

PELOBATIDAE — DUBOIS (D-19, D-26, D-29) recognized 4 subfamilies in this family on the basis of the works by DUBOIS (D-8), ROČEK (1981) and SOKOL (1982) — The range of *Megophrys parva* includes eastern and central nepal (D-1, D-3, D-6, D-13).

RANIDAE — *Laurentomantis* Dubois, 1980 is a replacement name for *Microphryne* Methuen & Hewitt, 1913, not for *Trachymantis* Methuen, 1920. — Without any explanation, the genus *Phrynobatrachus* is said to "include" the genera *Stenorhynchus*, *Hemimantis*, *Hylarthroleptis*, *Pararthroleptis* (part) and *Pseudarthroleptis* In fact, although this is not stated in *ASW*, this means that the synonymy first proposed by DUBOIS (D-11 : 253) for this genus is followed — except that the name *Microarthroleptis* should be added to the above list. The specification "part" (after *Pararthroleptis*) is not relevant here : a synonymy of generic names means that the type species of the various nominal genera are considered congeneric, irrespective of the fact that the authors of these generic names may or not have included other species in these genera. In this case, the species *Pararthroleptis nanus*, type species of *Pararthroleptis*, is included in *Phrynobatrachus*, thus agreeing with DUBOIS (D-11) in considering *Pararthroleptis* as a synonym of *Phrynobatrachus*.

DUBOIS (D-1) suggested that *Amolops kaulbacki* was possibly a subspecies of *A. formosus*, not of *A. afghanus*. — *Lanzarana* was explicitly (and not "by implication") regarded as a subgenus of *Rana* by DUBOIS (D-22). — The problems associated with the conservation of the name *Platymantis* in the place of *Cornufer* were discussed by DUBOIS (D-11). — The genera related to *Euphlyctis* mentioned by DUBOIS (D-11) cannot correspond to all the platymantines of SAVAGE (1973), as suggested in *ASW* (p. 478), since DUBOIS considered the latter heterogeneous ! The genera *Amolops*, *Micrixalus* and *Staurois* at least are certainly not closely related to *Euphlyctis* (see D-35).

It is not true that CLARKE (1981) rejected the view that *Euphlyctis* and *Limnonectes* are "close" to *Tomopterna* (*ASW* : 478) He only rejected the possibility to consider them as sister groups. The use of the vague term "close" (which does not mean "sister group") by DUBOIS (D-11) was purposeful, because (1) we still lack a lot of information on the phylogenetic relationships within the ranines ; and (2) this term conveys the idea that, whatever the phylogenetic relationships between the taxa, they have not experienced considerable divergence since the cladogenesis which has separated the lineages which led to them ; this latter type of information is considered by cladists of

no value for the construction of a classification, but evolutionary systematists do not agree with them in this respect. — The use of the terms "species group" and "species complex" is not consistent within the genus *Rana* : the *Rana pipiens* "complex" includes several "groups", while the "*Rana macrodon* complex" is included in the "*Rana grunniens* group". DUBOIS (D-4, D-14, D-30) suggested some rules for the use of these categories in zoology, in particular in Amphibia, which are not discussed or taken into account in *ASW*. — The evolutionary and systematic problems posed by the *Rana pipiens* group were discussed in some detail by DUBOIS (D-4). — The references given in *ASW* on the problems posed by the *Rana esculenta* group are most insufficient. In particular, the paper by DUBOIS & GÜNTHER (1982) should at least be cited and discussed, even if their proposals were not adopted. These authors argued that forms like *Rana esculenta* or, in salamanders, *Ambystoma platineum*, which arose from the hybridization of "good species" but do not behave genetically and evolutionarily like "normal hybrids", should not be considered like normal species or hybrids, but as belonging to a new category of the species-group, different from both the categories species and subspecies, and which they proposed to call "klepton" Any klepton may be grouped with the "good species" from which it arose by hybridization in a "synklepton". Following these proposals, amphibians kleptons should have been listed in *ASW* as *Rana* kl. *esculenta* or *Ambystoma* kl. *platineum*, such a way of notation indicating their peculiar characteristics — *Rana blanfordii* is absent from Uttar Pradesh and all the central and western Himalayas (D-2, D-3, D-5, D-6, D-13). — The name *Rana fusca* Blyth is preoccupied by several senior primary homonyms, not only by "*Rana fusca* Meyer". — The status of the species *Rana crassa* was discussed in some detail by DUBOIS (D-1). — The ranges of *Amolops monticola, Rana humeralis, Rana nigrovittata* and *Rana taipehensis* extend to the west to eastern Nepal (D-1, D-3, D-6, D-13). — The range of *Rana polunini* was recently discussed by DUBOIS (D-5). — It is not GORHAM (1974), but LIU (1935) who synonymized *Rana shini* whith *Rana spinosa*. — The status of the types of *Rana sikimensis* was discussed in detail by DUBOIS (D-3). — DUBOIS (D-20) placed the species *Rana leucorhynchus* in the *Rana breviceps* group of the subgenus *Tomopterna*, not in the *Rana rufescens* group (transferred later in the subgenus *Fejervarya* by DUBOIS, D-28). — The species *Rana sauriceps* belongs to this latter subgenus, not to *Hylarana* (see D-28).

RHACOPHORIDAE. — The name *Philautus* was not proposed as the name of a new genus, but as a replacement name for *Orchestes*. — The ranges of the species *Philautus annandalii*, *Polypedates leucomystax*, *Polypedates maculatus* and *Rhacophorus maximus* include Nepal (D-1, D-3, D-6, D-13).

AMBYSTOMATIDAE — Some "forms" of the genus *Ambystoma*, such as *Ambystoma* kl. *platineum* and *Ambystoma* kl. *tremblayi*, are not "true species" but belong in fact to the category klepton, as defined by DUBOIS & GÜNTHER (1982).

SALAMANDRIDAE. — DUBOIS (D-14, D-30) suggested that *Tylototriton* and *Echinotriton* be considered as subgenera of *Pleurodeles*.

Again, the above list of mistakes and omissions is certainly very incomplete, since I did not, far from this, check all the information provided for the 4015 species of the list. However the total number of mistakes is 52, for a total of 4488 taxa (4015 species, 395 genera, 78 families and subfamilies), i.e. an estimated EO rate of *at least* 1.2 % for all types of miscellaneous information together.

FINAL MISCELLANEOUS COMMENTS

Thanks to the use of a computer, the index of this book has been carefully prepared. All the names which I have looked for and which are mentioned in the book appear in the index. This is a strong superiority of this book over GORHAM's (1974) cheklist, for which the absence of any index is a major weakness. The existence of a finely prepared index in *ASW* is another reason for regretting the absence in this cheklist of the

synonyms and of the subspecies (except for arbitrary exceptions). As mentioned above, this will limit the usefulness of this index in allowing to avoid creating homonyms within a given genus.

I only found one misprint in the index of *ASW*: the name "*iris, Hyla*" appears on p. 693 between "*houyi, Hyperolius*" and "*hubeiensis, Rana*", and is lacking in its proper place on p. 699.

In the book itself, the following mistake may be noted : on p.598, under *Plethodon serratus*, the information on the type locality appears under the title "type species", and several lines are out of line in relation to the margin.

Recommendation 28A of the *Code* reads : "A species-group name should not be put as the first word of a sentence, to avoid its being printed with a capital initial letter." Actually, the editors of *ASW* ignored this recommendation, at least in the case of the name *Rana ventricosus* (p. 459), and possibly in others (I did not look systematically for this type of error).

The binding of the book is solid, and has resisted my repeated inquiries in the volume. However, the specimen I received for review had a defect in the back cover.

CONCLUSION

Table XII summarizes the data concerning the EO rates estimated above. The average EO rate for all these 18 types of data is 33.3 %, i.e. much higher than the 5 % threshold which we had fixed a priori as an "acceptable" rate of error or omission for such a checklist. However this average value is of little interest, because the types of information concerned are most unequal in importance and interest, because the precision of the estimate of the EO rate is variable from one case to another, and finally because no EO rate was calculated for some types of information. In particular, no EO rate was estimated for the completeness of the list as far as the species are concerned, but such a rate would certainly be very low. On the other hand, a high rate of error may be expected for real dates of publications of papers or books, since, as exemplified several times above, no systematic research of this information was carried out (as shown e.g. by the fact that papers like SCLATER, 1893 and DUNCAN, 1937 are never cited). What is relevant however is the fact that, out of 18 different types of information studied, only five (Nos. 6, 10, 12, 13, 18) have an EO rate below the 5 % threshold. Furthermore, for 4 of these 5 items, the EO rate is clearly underestimated, for reasons explained above. For the 13 other items, the rate is between 7.2 % and 90.9 %, which is much too high to be "acceptable" according to our a priori criterion.

This and the detailed discussion above clearly point to the fact that this checklist has been prepared and published much too quickly and that it does not fit the requirements which it should fit to be fully useful to the international batrachological community. What may be feared now is that, despite its statement to the contrary (*ASW* : 1), this checklist might tend "to standardize or institutionalize amphibian taxonomy". If the numerous mistakes which appear in the book are uncritically repeated by many authors, they will become more difficult to rectify. My hope in working on this detailed review has been to limit at least partially this negative impact by providing corrections to some of the mistakes of the book. Other mistakes certainly remain. It will be necessary to take

Table XII. — Rates of errors (E rate) and of omissions (O rate), and cumulated rate of errors and omissions (EO rate) for various types of information given in *ASW* (see text for explanation). Rates are given in percent.

Type of information	Table	E rate	O rate	EO rate
1. Valid names of taxa of the class-group	I	14.3	-	14.3
2. Correct authors and names of taxa of the class-group	II	14.3	71.4	85.7
3. Correct spellings of names of taxa of the class-group	III	42.9	-	42.9
4. Valid names of taxa of the family-group	I	7.2	-	7.2
5. Correct authors and names of taxa of the family-group	II	23.7	16.5	40.2
6. Correct spellings of names of taxa the family-group	III	0.8	-	0.8
7. Correct references to the first uses of the correct spellings of names of taxa of the family-group	IV	12.2	65.6	77.9
8. Correct first page or appearance of new names or new spellings of names of taxa of the family-group	V	35.7	-	35.7
9. Correct first page of appearance of generic names created by TSCHUDI (1838)	Text	41.7	-	41.7
10. Information on valid names, authors, dates and references of genus-group taxa (excluding TSCHUDI's names)	Text	3.0*	0.8*	3.8*
11. Correct authors and dates of names of taxa of the rank subgenus	VI	-	90.9	90.9
12. Information on valid names, authors, dates and references of species-group taxa	Text	1.3*	0.2*	1.5*
13. Correct type species of nominal genera and subgenera	VI - VII	2.5*	2.5	4.9*
14. Correct mode of designation of type species of nominal genera	VIII - IX	6.6*	24.8	31.4*
15. Correct mode of designation of type species of nominal genera created by FITZINGER (1843)	Text	31.3	50.0	81.3
16. Identification of the type specimens of nominal species	X	-	19.9	19.9*
17. Identification of the type specimens of nominal species deposited in the Paris Museum	Text	10.2*	8.6*	18.8*
18. Various informations on taxa	Text	0.8*	0.4*	1.2*

* this rate is certainly underestimaded (see text).

advantage of these and other comments to correct the list and prepare an improved second edition of this book. The sooner this revised edition appears, the better, since it will limit the spread of some mistakes in batrachological publications. I would therefore suggest that, except for the major institutions which cannot do without buying this expensive volume for their libraries, individual batrachologists rather await the second, revised, edition of the book to buy it. Hopefully, this will include synonyms and subspecific names, which would make it a most useful tool for all biologists interested in Amphibia.

RÉSUMÉ

Le volume *Amphibian species of the world* publié en 1985 sous la direction de D.R. FROST est le résultat d'un travail collectif dû à 59 auteurs. Il donne les noms de 4015 espèces actuelles d'Amphibiens, ainsi que diverses informations les concernant. Bien qu'une telle liste soit d'un grand intérêt potentiel, aussi bien pour les systématiciens que pour

tous les autres biologistes travaillant sur les Amphibiens, cette première édition pose plusieurs problèmes importants. Le choix des informations données dans cet ouvrage, notamment, est fort discutable : en particulier, l'absence des synonymes et des noms subspécifiques réduit grandement l'utilité d'une telle liste. De plus, même pour les données qui y figurent, le taux d'erreurs et d'omissions, tel qu'on peut l'estimer pour différents types d'informations, est bien trop élevé pour que cette liste puisse être considérée comme un document de base fiable dans les domaines de la taxinomie, de la nomenclature et de la bibliographie batrachologiques. De telles faiblesses proviennent manifestement de ce que cette première édition a été préparée et publiée bien trop vite, et il paraît en conséquence indiqué d'attendre au moins la deuxième édition, révisée, de cet ouvrage.

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Alytes, 1986, **5** (3) : 150.

Miscellanea nomenclatorica batrachologica (XIII)

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A replacement name is proposed for *Rana muta* Su & Li, 1986, a primary homonym of *Rana muta* Laurenti, 1768.

SU & LI (1986 : 152) ont récemment décrit sous le nom de *Rana muta* une espèce nouvelle du groupe de *Rana (Paa) yunnanensis* Anderson, 1878 (sensu DUBOIS, 1987). Ce nom ne peut être conservé pour cette espèce, étant un homonyme primaire du nom *Rana muta* Laurenti, 1768, actuellement considéré comme un synonyme de *Rana temporaria* Linné, 1758. Nous proposons le nom de remplacement suivant pour cette espèce, que nous dédions à la mémoire du Professeur Cheng Chao LIU de Chengdu :

Rana (Paa) liui nom. nov.

Nomen novum pro *Rana muta* Su & Li, 1986 (nec *Rana muta* Laurenti, 1768).

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Alytes, 1986, **5** (3) : 151-152.

Un livre sur les Amphibiens d'Australie occidentale

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TYLER, SMITH & JOHNSTONE's book on frogs of Western Australia is reviewed.

TYLER, M. J., SMITH, L. A. & JOHNSTONE, R. E., 1984. — ***Frogs of Western Australia***. Perth, Western Australian Museum : i-xii + 1-109. Prix : 16.00 $.

Pour le batrachologue les régions australes partagent le double intérêt de posséder à la fois des peuplements d'Anoures très originaux et des spécialistes attachés à en faire connaître les richesses à travers des Faunes, des Catalogues et des Guides. Ainsi, en Afrique du Sud comme en Australie, il existe à présent des ouvrages sur les Anoures qui s'adressent non seulement aux batrachologues confirmés mais visent aussi, par leur présentation et leur illustration, un public d'amateurs désireux de mieux connaître la faune de leur pays. Le fait que de tels ouvrages, coûteux en raison de leur iconographie, puissent cependant être édités montre combien le "marché" représenté par les "batrachophiles" doit être important dans ces régions : on peut regretter que le phénomène ne revête pas la même ampleur chez nous...

"Frogs of Western Australia", paru en 1984, est le *cinquième* ouvrage sur les Anoures d'Australie, ce qui confirme notre propos. Il est dû à la collaboration de M. J. TYLER, un des Maîtres de la batrachologie australienne, de L. A. SMITH et de R. E. JOHNSTONE. Couvrant la totalité de la faune amphibienne de la moitié occidentale du continent australien, il comprend 171 pages et 12 planches réunissant 72 photos en couleurs, auxquelles s'ajoutent 18 dessins d'excellente facture et 49 cartes de répartition.

Dans un premier chapitre, les auteurs comparent la faune de l'Australie occidentale à celle de l'ensemble du continent : 70 espèces sur les 177 actuellement répertoriées, mais une quarantaine sont propres au territoire considéré.

Un second chapitres permet de définir les différents termes descriptifs employés en Morphologie des Anoures ; l'utilisateur non spécialiste verra sa tâche considérablement simplifiée grâce à la qualité des dessins au trait.

Deux courts chapitres donnent ensuite quelques précisions sur les œufs, les pontes et les têtards.

Le début de la partie proprement faunistique est marqué non pas par une mais par trois clés de détermination. Nul n'ignore combien il est difficile d'élaborer de telles clés quand elles concer-

nent des régions à batrachofaune riche, où certains genres peuvent compter plus d'une dizaine d'espèces. Les auteurs n'ont pas refusé l'obstacle, mais en ont diminué l'importance en proposant des clés distinctes pour chacun des territoires biogéographiques reconnus en Australie occidentale. Il est certain que cette méthode facilite l'établissement des clés en restreignant le nombre des espèces qui doivent y être incorporées — avantage particulièrement sensible pour les genres multispécifiques dont certaines espèces, allopatriques, ne risquent pas d'être trouvées ensemble. Nous doutons toutefois que ce procédé puisse être appliqué sans inconvénient à d'autres parties du globe, comme l'Afrique centrale par exemple, où les zones biogéographiques montrent d'amples gradients intermédiaires, quand elles ne s'interpénètrent pas...

Lorsqu'il tente de construire des clés dichotomiques, le batrachologue se heurte à une autre difficulté : trouver de bons caractères diagnostiques morphologiques, tâche épineuse dans un groupe où les espèces "jumelles" ou "sub-jumelles" ne sont pas rares. Ici, les auteurs ont préféré contourner l'obstacle, en introduisant dans leurs clés des caractères biologiques. C'est ainsi que le lecteur a le choix (p. 19), pour séparer deux groupes d'espèces de *Ranidella*, entre "Call resembles a squelch" et "Call does not resembles a squelch". Un pareil critère sera sûrement apprécié du naturaliste de terrain — auquel s'adresse surtout cet ouvrage — encore qu'une femelle ou un mâle en dehors de la période de reproduction puissent le laisser perplexe, mais l'identification au laboratoire posera un problème insoluble.

De nombreuses photos en couleurs complétées par de courtes descriptions axées sur les caractères discriminants permettront cependant à l'utilisateur d'arriver à ses fins. Pour chaque espèce, l'exposé suit un plan standard comprenant les points suivants : description, distribution, appel nuptial, reproduction, habitat, auxquels s'ajoutent des remarques de nature diverse. La partie traitant des espèces comprend 75 pages. Une bibliographie de 70 références termine l'ouvrage.

Grâce aux photos, les amis des Batraciens y découvriront une galerie de portraits particulièrement dépaysante en raison du faciès étrange de certaines espèces. L'écologiste y trouvera quelques beaux exemples d'adaptation à la vie fouisseuse, fréquente dans une faune riche en espèces déserticoles. Quant aux batrachologues, ceux d'entre eux qui ont l'expérience de la faune africaine ne manqueront pas d'admirer certains cas de convergence morphologique : la palme revient ici au genre *Litoria*, où des espèces ressemblent, même dans leurs attitudes, à des *Hyperolius* (*L. bicolor*, *L. microbelos*) ou à des *Leptopelis* (*L. rothii*), similitude concevable pour des "rainettes", mais aussi, ce qui est plus extraordinaire, à des *Ptychadena* (*L. nasuta*, *L. tornieri*).



ALYTES

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